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Summary of Noise Programs in the Federal Government

Environmental Protection Agency

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SUMMARY OF NOISE PROGRAMS IN THE FEDERAL GOVERNMENT

DECEMBER 31, 1971

U.S. Environmental Protection Agency
Washington, D.C. 20460

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Title IV of the Clean Air Amendments of 1970 (PL-91-604) required the Administrator of the Environmental Protection Agency (EPA) to prepare a report on noise for submission to the President and Congress. This document is the basis for the section of that report devoted to Federal noise abatement and control programs over the past two or three years.

To collect the necessary data, the Director of the Office of Noise Abatement and Control on 30 July 1971 issued a request to all Federal agencies for information on their nose programs. A total of 17 agencies responded to the request.

For the purpose of this document, responses of the agencies will be discussed in three groups on the basis of:

1. The extent of their authority and impact upon the field of noise abatement and control.
2. The extent of their response to the report format.

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INTRODUCTION

Title IV of the Clean Air Amendments of 1970 (PL-91-604) required the Administrator of the Environmental Protection Agency (EPA) to prepare a report on noise for submission to the President and Congress. This document is the basis for the section of that report devoted to Federal noise abatement and control programs over the past two or three years.

To collect the necessary data, the Director of the Office of Noise Abatement and Control on 30 July 1971 issued a request to all Federal agencies for information on their noise programs. A total of 17 agencies responded to the request. The letter of inquiry and report format are exhibited in Appendix A.

It is recognized that this document represents information collected in response to a specific inquiry and is basically a byproduct of the much broader report to the President and Congress. However, in view of the varied and qualitative nature of the collected data, this report was prepared to better inform representataves of government and the private sector as to the significant achievements and directions of Federal noise programs.

SUMMARY

There is, at present, extensive ongoing activity by various Federal agencies in noise abatement and control. Federal noise programs are the responsibility of a number of agencies, with the main thrust residing within the Department of Defense, National Aeronautics and Space Administration, Department of Health, Education and Welfare, Department of Housing and Urban Development, and, now, the Environmental Protection Agency. There are continuing efforts by many individual agencies to accomplish short and long range objectives, commensurate with their mission.

For the purpose of this document, responses of the other agencies will be discussed in three groups on the basis of:

1. The extent of their authority and impact upon the field of noise abatement and control.
2. The extent of their response to the report format.

In addition to the Environmental Protection Agency, departments performing a significant effort in the field of noise abatement are:

The National Aeronautics and Space Administration
Department of Defense
Department of Transportation
Department of Health, Education and Welfare
Department of Commerce
Department of Housing and Urban Development
Department of Labor

Agencies having more moderate programs are:

Department of Agriculture
General Services Administration
Department of the Interior

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National Science Foundation
The Postal Service Commission

Finally, agencies reporting relatively minor programs were:

Atomic Energy Commission
Federal Power Commission
State Department
Tennessee Valley Authority
Treasury Department

The following portion of this report presents a brief description of the noise activities of other Federal Agencies and is followed by Table 1, which depicts the status of federal noise research activities. The actual responses to the original request for information are presented in Appendix B and are organized according to the extent of their respective efforts.

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EFFORTS OF OTHER AGENCIES

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION (NASA)

The NASA (as well as its predecessor, NACA) has been deeply involved in aircraft noise research for many years. The Fiscal Year 1972 program includes contract and in-house research totaling $25 million in the areas of reduction of aircraft noise at the source, noise propagation, effects on receptors, sonic boom, and approach trajectory modification. Of this total, $12.6 million is contracted research, $5.4 million covers test equipment and instrumentation for the in-house research, and $7 million is budgeted for research and program management (chiefly in-house research manpower costs). Construction of a new aircraft noise reduction laboratory is underway at the NASA Langley Research Center, and the laboratory, costing about $5.8 million and scheduled for completion late in 1972, will provide a major expansion of the national capability.

In addition to research activities, NASA provides noise protection for its employees through work site surveillance and audiometric testing, supplemented by general medical protection.

THE DEPARTMENT OF DEFENSE (DOD)

Noise abatement efforts by DOD have been both considerable and long-standing. The armed services particularly are involved in research on noise and noise abatement procedures. The primary DOD thrusts are concentrated in four main areas:

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1. Occupational noise control and hearing conservation.
2. Operational aircraft noise abatement.
3. Noise signature elimination in weapons system.
4. Construction specifications for noise control.

At present, noise programs are conducted in the department by each of the three military branches to meet specific operational requirements; that is to say:

Army Noise Efforts

Army noise programs are carried out through the following agencies:

- Office of the Chief of Research and Development, U.S. Army. This office is conducting a study ($82,000) on noise induced hearing loss and the effects on the efficiency of soldiers' performance.
- Office of Chief of Engineers, U.S. Army. The Corps office conducts research on the control of noise generation and the application of measures to eliminate noise levels that may adversely affect humans. Current investigations include work in establishing criteria for the location of certain military activities relative to residential areas and the identification of causes of noise and control criteria during construction activities. Fiscal support for noise related work within the Corps cannot be determined. No personnel are specifically assigned to noise control programs.
- Army Medical Research and Development Command. This command conducts programs and research concerned with biomedical effects of noise, noise reductions, noise exposure, and the physiological and psychological effects of noise. Current programs include traumatic origins of hearing losses, auditory perception and psychophysics, and the aviation audiometry program. The operating budget for fiscal 1972 is $464,300.
- Army Environmental Hygiene Agency and Environmental Health Engineering Services. Both agencies conduct programs to assure the health of personnel. Current programs include the Hearing Conservation Program for the surveillance of occupational hearing loss and studies of the effects of noise on individuals at military installations. The operating expenditures for the noise program cannot be determined.

- Army Materiel Command. Under this Command, programs and research are carried out under contract for noise reduction of equipment, rotary wing aircraft noise reduction, and determinations of human capabilities. Expenditures for fiscal 1972 are approximately $650,000.

Air Force Noise Programs

The Air Force conducts research under authority of 10 U.S.C. § 8011. Program activities related to noise include the conservation of hearing program (AFR 160-3; Hazardous Noise Exposure), with an operational expenditure of $509,300 for fiscal 1972. Research programs are conducted at the Aero-Propulsion Laboratory, the Flight Dynamics Laboratory, the 6570th Aerospace Medical Research Laboratory, and the Weapons Laboratory. Contracted research is maintained by the Air Force Office of Scientific Research. There are no laboratories presently devoting full resources to noise research. Less than 3 percent of the total resources of laboratories having noise research programs is allocated to that end. The Office of Scientific Research conducts research on aircraft noise generation processes. Estimated funding for the projects is $80,000. The Flight Dynamics Laboratory is conducting development work on aircraft acoustics, including noise control within vehicle interiors and sonic fatigue, with current expenditures of $290,000. The Aerospace Medical Research Laboratory conducts research on the effects of noise on Air Force personnel. Specializing in bioacoustical research, this Laboratory is unique among Federal noise research programs. Expenditures for such research are $410,000. The Aero Propulsion Laboratory, with expenditures of $475,000, is concerned with noise abatement in aircraft propulsion systems. The Air Force Weapons Laboratory is researching computerized noise exposure forecasting and has expenditures of $80,000. Total expenditures for research are $1,255,000. Additionally, the Air Force has a program for the development and acquisition of sound suppressors for ground runup and jet aircraft engines. This work is done entirely by contract at an expenditure of $4,810,000.

Navy Noise Program

The Navy noise abatement program concerns aircraft and related ground facilities and equipment and is divided into the areas of:

- Noise reduction of operating aircraft.
- Noise suppression for ground runup of engines.
- Noise suppression for overhaul and maintenance testing.

In addition, an exploratory development program concerning a semi-portable noise suppressor for gas turbine engines is underway. A contract for $187,000 has been awarded for the exploratory development program in fiscal 1972.

DEPARTMENT OF HEALTH, EDUCATION AND WELFARE (HEW)

The largest single component of HEW, the Social Security Administration, conducts a hearing conservation program as part of its occupational health activities. Program objectives are to remove hazardous noise sources and otherwise protect employees from adverse noise effects. Other concerns include the isolation and evaluation of noise-producing equipment. Occupational medical guidelines described in PL 79-658 and DOD circular A-71 govern the administration of the program

The Occupational Safety and Health Act provides authority for the National Institute for Occupational Safety and Health to undertake research with the objectives of:

1. Refining occupational noise limits for conserving hearing.
2. Assessing industrial noise effects on overall health, safety, and performance capability.
3. Considering the differential diagnoses of noise-induced hearing loss cases.

4. Training and demonstration projects bearing on industrial noise control and hearing conservation.

Funding for these assorted activities in FY 1972 will be in excess of $400,000.

Likewise, the National Institute of Health (NIH) is vested with authority to conduct research on noise as part of its broad mission. NIH-sponsored studies are being conducted largely on the physiological mechanisms underlying noise-induced hearing loss and aspects of speech perception in noise through grants awarded to various universities and laboratories totaling nearly $1,000,000.

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT (HUD)

Noise abatement and control is not a separate program within HUD; however the Secretary has established noise control requirements for HUD programs (HUD Circular 1390.2). HUD is concerned with noise problems arising in housing site selection, structural characteristics of buildings, and land use planning. These areas include development of comprehensive urban noise survey methodologies, metropolitan aircraft noise abatement policy studies, and technical support for operational noise abatement programs in the department. Plans for future consideration include extension of the Comprehensive Urban Noise Survey Program, measurement instrumentation for determining site noise exposure, site noise exposure techniques, development of model ordinances and building code sections, and noise emission ratings for appliances and equipment. Approximately $500,000 has been programmed for noise activities in HUD for FY 1972.

DEPARTMENT OF LABOR (DOL)

The main DOL emphasis on noise is in two areas: The Walsh Healey Contracts Act, which covered health standards for employees engaged in

Federal contracts of over $10,000, and The 1970 Occupational Safety and Health Act, extending coverage to all businesses engaged in interstate commerce. Worker exposure standards under the two acts are identical. There are approximately 80 million Americans composing the work force; the overwhelming bulk of these is somehow engaged in interstate commerce. Hearing loss due to noise is, of course, one of the health considerations covered under the 1970 legislation. The Act contains a rule for limiting noise induced hearing losses at the workplace.

DEPARTMENT OF TRANSPORTATION (DOT)

In accordance with the Department of Transportation Act of 1966 (P.L. 89-670), Section 4, DOT is engaged in research and development relating to transportation noise, particularly aircraft noise. Additionally, P.L. 90-411 provided for noise certification of aircraft. A separate office of Noise Abatement administers the noise program within DOT. It's programs are concerned with: 1) evaluating community response to noise, 2) developing measurement criteria, 3) evaluating noise sources, 4) developing mathematical models for estimating noise and evaluating the impact of noise. The office's many technical research programs include investigation of truck engine noise and jet noise as well as the development of measurement equipment and procedures. Twenty percent of the office's budget ($5,745,000) is spent in the utilization of the technical capabilities of the Transportation Systems Center at Cambridge, Massachusetts as well as those of outside contractors. The Center investigations, amounting to $900,000, include measurement and simulation modeling of community noise levels caused by transportation related sources and research of mechanisms of noise generation in jet engine exhaust V/STOL aircraft, and internal combustion engines.

Included within the DOT research and development effort is that of the Federal Aviation Administration in which aircraft noise suppression and adverse effects of sonic boom are heavily emphasized. Expenditures for this program total $3,150,000.

Finally, the Federal Highway Administration conducts a noise research program whose scope includes traffic noise measurements, evaluation and abatement. Expenditures for this effort total $149,000.

DEPARTMENT OF AGRICULTURE (USDA)

The USDA is engaged in eight specific noise reduction programs. The overall objective of these programs is to determine noise levels emanating from agricultural sources. As a part of this effort, USDA conducts research, through grants to state agriculture experiment stations of $250,000, on noise propagation and attenuation from vegetative screens. Authority for this research is found under the Clark-McNary Act of 1942, the McSweeny-McNary Forest Research Act of 1928, and the Agricultural Experimental Station (Smith-Lever) Act of 1955. Moreover, USDA and the U.S. Air Force participated in a mutual research effort on the effects of noise on chickens, cows, and swine.

DEPARTMENT OF COMMERCE (DOC)

Within DOC, research and measurement programs in acoustics are conducted by both the National Bureau of Standards (NBS) and the National Oceanic and Atmospheric Administration (NOAA). Only programs of the former division, however, are specifically directed toward noise abatement.

Within NBS, the Institute for Basic Standards (IBS) is currently involved in two noise-related projects:

1. An investigation of reverberant sound fields, with an aim of developing new, improved methods for measurement of sound absorption and sound power in reverberation chambers.

2. A study of current methods for measuring the subjective factors of loudness, noisiness and annoyance and the development of new methods for subject measurement.

In addition to these two programs, NBS is also engaged in basic research including the development and standardization of calibration procedures for various sound measuring equipments. NBS has also undertaken research with DOT on truck tire noise and has joined with HUD on a project called "Operation Breakthrough" measuring noise levels at building sites.

NBS is also concerned with passenger car tire noise and has conducted studies on the subjective factors of this particular type of noise. It also tests noise characteristics of toys and of postal mail sorting machines.

Also under NBS, the Institute for Applied Technology is conducting a variety of research programs concerning noise abatement in buildings. The development of improved test methods is emphasized both for measuring sound transmission and for rating and testing the overall acoustical performance of entire buildings.

In addition to these direct research projects, NBS presently has a working budget of about $465,000 for programs sponsored by eight other agencies (including EPA). The current operating budget is $500,000, of which approximately $200,000 is applied directly toward noise abatement research. A $200,000-increase in funding is expected for fiscal 1973, which would allow NBS to expand its efforts in noise control. Contracts totalling $41,000 have been negotiated with two private organizations to obtain data relating to noise in European environments and to gather information concerning the acoustical properties of doors and windows. This latter data is expected to provide architects with valuable information in practical design. DOC has no authority in the area of noise regulation or certification.

GENERAL SERVICES ADMINISTRATION (GSA)

The magnitude of GSA operations requires inclusion in this discussion. Although it has no formal noise abatement program, GSA is developing noise abatement procedures for construction and demolition activities.

Maximum sound level criteria for mechanical building equipment were established in 1970, and are included in specifications for major construction projects. These levels are more stringent than those established by the Department of Labor under the Occupational Safety and Health Act. Constructional noise currently is being monitored at the site of the building now under construction in Philadelphia, Pa., to determine possible criteria for future development of noise abatement standards. As for space already occupied, GSA is continuously developing sound level criteria to improve the acoustical environments of buildings. Finally, GSA is amending procurement specifications to require quieter products. This agency will have a profound impression in noise reduction through its vast purchasing power. Data on funds for support of these activities was unavailable at the time this report was prepared. (GSA's noise abatement program is not budgeted separately.)

DEPARTMENT OF THE INTERIOR (DOI)

This agency is currently involved in conducting three specific noise programs.

1. An FAA-funded project for monitoring the frequency and characteristics of sonic booms in certain national parks.
2. A Bureau of Mines instituted training program for inspectors who will survey noise conditions in mines.
3. A research program instituted by the Bureau of Mines and HEW to study noise problems in mines and related hearing loss suffered by miners. Only the Bureau of Mines program has been specifically budgeted for noise abatement and control. Estimates include $45,000

for research and $19,000 for an acoustical research inventory. Future DOI program plans in the noise field are almost entirely limited to this program.

DOI legislative authority for noise research together with regulations for the further definition of that authority are: The Federal Coal Mine Health and Safety Act of 1969 and the Act of May 28, 1936, and regulations found in 41 CFR 14; 50 CFR 4; 36 CFR1; 30 CFR 1, 43 CFR 2; and 30 CFR 1(F) (70).

NATIONAL SCIENCE FOUNDATION

From 1968 through 1971, the Foundation funded equipment purchases for noise research amounting to $99,200. The Special Engineering Program director and his staff spend about 15 percent of their time on acoustics and noise control. Time is also committed to the noise area in the psychobiology and neurobiology programs. Similarly, a number of projects on noise research are funded through contracts or grants. Total research expenditures for noise projects in fiscal 1971 were $175,000. While no projections for future noise research have been made, the Foundation has stated that it expects to fund additional projects in noise and acoustics.

THE POSTAL SERVICE COMMISSION (PSC)

The newly formed PSC is currently involved in three specific programs designed to reduce noise in the workroom area. Two research projects aimed at identifying existing noise sources, determining noise abatement procedures, and implementing prototype modifications have been initiated. On a trial basis, special Postal Service Specifications have been issued on the development of new equipment to ensure that operator noise levels do not exceed a given level. Expenditures for personnel and contracts amounted to $250,000. PSC has no individual assigned to noise abatement programs on a fulltime basis. Moreover, it reports no legislative requirements and states that future noise control plans will depend largely on the results of current projects.

ATOMIC ENERGY COMMISSION (AEC)

In the process of obtaining licensing for nuclear power plants, the AEC, under procedures issued by the Director of Regulations, provides assurance that noise is considered, as required by Section 102(2)(c) of the National Environmental Protection Act of 1969. Other than this, the AEC has no activities related directly to noise control.

FEDERAL POWER COMMISSION (FPC)

The FPC, in the exercise of its authority for licensing hydroelectric projects and other power-generating sources, considers noise as an environmental factor.

DEPARTMENT OF STATE

The State Department, in its general mission as the institutional representative of this nation to foreign countries, has widespread contacts with foreign governments on environmental matters, including noise. Additionally, State intends to work closely with the GSA in determining and enforcing noise level tolerances for facilities it uses.

TENNESSEE VALLEY AUTHORITY (TVA)

The TVA is planning to undertake a study on the effects of gas turbine generating plants on community noise levels, to be funded from the General Industrial Hygiene budget. TVA intends to develop standards and criteria for use by design and operating organizations in community noise control. An expenditure of $45,000 for fiscal 1971 was reported for community noise efforts and noise measuring instrumentation.

TREASURY DEPARTMENT

The Bureau of the Mint reports three sources of external noise generation causing public complaint:

1. Melting furnace exhausts at the Philadelphia mint.
2. Rolling mills at the Denver mint.
3. Presses at the San Francisco Assay Office, where coins are currently minted.

The Bureau reports a continuing independent (though as yet unsuccessful) effort to solve these problems. No funds have been appropriated for the projects, however, nor have personnel been expressly assigned to the program.

Table 1 depicts the current overall status of Federal noise control research activities.

Table 1

SUMMARY OF FEDERAL NOISE RESEARCH ACTIVITY^{++}

Organization	Activity Statement(s) (Parentheses indicate the number of projects* or programs^{+} in each activity)	Source		Operating Budget* (FY '72) in thousands	Expenditures (past 3-5 yrs) in thousands	Activity Period (FY) '65 '68 '70 '71	Status	
		In-house	Contract or Sponsored				Continuing	Terminated or Completed
Department of Agriculture	noise source surveys (5)* noise propagation & attenuation by vegetative screens (5)*	x	x	250	–			
Department of Commerce National Bureau of Standards	research & measurements in acoustics and noise abatement and control programs (4)$^{+}$; reverberant sound fields; loudness, noisiness and annoyance; building acoustics; standardization & calibration of sound equipment	x	x	500	1,410	x x x x	x	
National Oceanic and Atmospheric Administration	atmospheric acoustics and sound propagation (–)$^{+}$							
Department of Defense Army Corps of Engineers	noise generation control, construction noise criteria (2)$^{+}$	x		15	63.8	x x x	x	
Research & Development Command	biomedical effects of noise, noise reduction, physiological & psychological effects of noise (3)$^{+}$	x		352	881.6	x x x	x	

++ This information was extracted from that provided by the respective Federal organizations. Much of the information received was either incomplete or required interpretation; therefore, this cannot be considered as a comprehensive compilation of the status of noise research activity. It does however reflect the areas of emphasis and approximate support.

– Indicates the information was not supplied by the reporting organization, or the information could not be extracted from the information provided to reflect a valid interpretation.

Table 1 (Cont.)

Organization	Activity Statement(s) (Parentheses indicate the number of projects* or programs^{+} in each activity)	Source		Operating Budget* (FY '72) in thousands	Expenditures (past 3-5 yrs) in thousands	Activity Period (FY) '68 '69 '70 '71	Status	
		In-house	Contract or Sponsored				Continuing	Terminated or Completed
Department of Defense Army (Cont.) Environmental Hygiene Agency & Environmental Engineering Services	hearing conservation program (1)$^{+}$ noise effects on persons at military installations (1)$^{+}$	x		47	–	x x x	x	
Materiel Command	equipment noise reduction, rotary wing noise reduction, human capabilities (6)$^{+}$	x	x	650	627	x x x	x	
Office of Research and Development	biomedical effects of noise in the military environment (1)$^{+}$		x	–	82	x		x
Air Force Office of Surgeon General	hearing conservation (1)$^{+}$	x		509	2,614	x x x x	x	
Office of Scientific Research	aircraft noise generation (4)*	x	x	80	298	x x x x	x	
Flight Dynamics Laboratory	aircraft acoustics, sonic fatigue, noise control in vehicle interiors (10)*	x	x	290	1,137	x x x x	x	
Medical Research Laboratory	effects of Air Force generated noise upon its personnel (18)*	x	x	410	1,569	x x x x	x	
Aero-Propulsion Laboratory	noise abatement of aircraft propulsion systems (13)*	x	x	475	794	x x x x	x	
Weapons Laboratory	computer noise exposure forecasting (1)$^{+}$	x		80	50	x	x	
Suppressor Program	sound suppressors for ground maintenance of aircraft engines (–)$^{+}$		x	4,810	27,102.5	x x x x	x	

Table 1 (Cont.)

Organization	Activity Statement(s) (Parentheses indicate the number of projects* or programs† in each activity)	Source		Operating Budget* (FY '72) in thousands	Expenditures (past 3-5 yrs) in thousands	Activity Period (FY) '68 '69 '70 '71	Status	
		In-house	Contract or Sponsored				Continuing	Terminated or Completed
Department of Defense Navy	noise reduction of operating aircraft, noise suppression of ground run-up of engines (–)†; exploratory development program of semi-portable engine noise suppressor (1)†	x	x	–	3,900	x x x x	x	
Environmental Protection Agency Office of Noise Abatement & Control	investigation & study of noise & its effect on the public health & welfare (1)† (report to Congress)	x	x	500.1			x	
Department of Health, Education & Welfare Social Security Administration	health effects & protection against high noise levels hearing conservation (–)†	x		–	–	x x x x	x	
National Institutes of Health	physiological & psychological effects of noise (8)*		x	21	383 (FY 71)	x x	x	
Health Services & Mental Health Administration	hearing loss from nonoccupational noise exposure (1)*; interim criteria for environmental noise control (–)*	x	x			x x x x		x (FY 72)
Department of Housing & Urban Development	noise policy & standards for site selection, structural characteristics, land use, urban noise survey methodology (1)*; metropolitan aircraft abatement policy studies (4)*	x	–	–	–			

Table 1 (Cont.)

Organization	Activity Statement(s) (Parentheses indicate the number of projects* or programs^{+} in each activity)	Source		Operating Budget* (FY '72) in thousands	Expenditures (past 3-5 yrs) in thousands	Activity Period (FY)				Status	
		In-house	Contract or Sponsored			'68	'69	'70	'71	Continuing	Terminated or Completed
Department of the Interior Park Service	monitoring frequency & characteristics of sonic booms in certain National Parks (–)$^{+}$	x	x	–	–				x		
Bureau of Mines	training program for noise survey inspectors (–)$^{+}$; noise problems and hearing loss in mines (–)$^{+}$	x	x	214	45				x		
Department of Labor	occupational noise, noise surveys, criteria and standards (–)$^{+}$	x		–	–				x	x	
Department of State	none										
Department of Transportation	noise abatement of transportation noise (–)$^{+}$	x	x	5,745		x	x	x	x		
Transportation Systems Center	community noise caused by transportation sources (–)*			900				x	x	x	
Federal Highway Commission	traffic noise measurement & abatement (–)*			148				x	x	x	
Federal Aviation Agency	aircraft noise suppression (–)* sonic boom effects (–)*			3,150				x	x	x	
Department of the Treasury Bureau of the Mint	control of community noise emitted by mint equipment (3)*;	x		–	–				x		
Secret Service	hearing conservation (–)$^{+}$	x		–	–				x		
Atomic Energy Commission	none										
Federal Power Commission	none										

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Table 1 (Cont.)

Organization	Activity Statement(s) (Parentheses indicate the number of projects* or programs^{+} in each activity)	Source		Operating Budget* (FY '72) in thousands	Expenditures (past 3-5 yrs) in thousands	Activity Period (FY) '68 '69 '70 '71	Status	
		In-house	Contract or Sponsored				Continuing	Terminated or Completed
General Services Administration	procedures for noise abatement of construction & demolition operations (1)*; amending procurement requirements for quieter products (1)*	x		–	–			
National Aeronautical and Space Administration	aircraft noise and noise reduction . . .source noise (35)*; propagation noise (4)*; receptor noise (11)*; sonic boom and approach trajectory modifications (12)*; hearing conservation program (–)$^{+}$	x	x	2,500	20,887	x x x x		
National Science Foundation	supports meritorious proposals for research on effects of noise, noise control, and acoustics (10)*		x	–	641	x x x x	x	
Post Office Department	noise abatement of postal equipment (2)*; noise standards for new postal equipment (1)$^{+}$	x	x	170	250	x	x	
Tennessee Valley Authority	community noise effects and noise measuring instrumentation (–)$^{+}$	x		–	45	x		
Total				22,475.1	62,779.9			

Appendix A

LETTER OF INQUIRY AND REPORTING FORMAT

ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

July 30, 1971

TO:

Title IV of the Clean Air Act of 1970 requires this office to prepare a report to the Congress concerning noise and its effects on the public welfare.

Attached is an outline of the section of the report dealing with Federal activities in noise effects, abatement and control. It is requested that you supply the information called for in the outline as it applies to your agency. In order to meet the report deadline of December 31, 1971, it is necessary that we have your replies by August 30, 1971.

There is a continuing requirement that we maintain current information on Federal noise programs. This office should be routinely informed of changes in the information supplied in response to this inquiry. It is suggested that you establish a procedure to insure that we have the most up-to-date information concerning your noise program. In the course of fulfilling the requirements of Section 402(c) of Title IV, we will request that you conduct a survey to identify your activities which are now producing objectionable noise. This will amount to essentially an emission inventory of major noise sources owned, sponsored or controlled by the Federal Government. Guidance in this matter will be given to you in the near future.

If specific questions arise, we will be pleased to meet with you to discuss your programs on an individual basis. Our agency's contacts regarding this matter are Mr. R.M. Marrazzo and Captain J.B. Bomar at 254 - 7424.

Sincerely yours,

Alvin F. Meyer, Jr.
Director
Office of Noise Abatement and Control

ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

FEDERAL NOISE PROGRAMS INFORMATION

I. Organizational

- A. Parent Agency, Department, etc.
- B. Legislative Requirements and Authority for Noise Function and Funding

II. Functional

- A. Overall Program Objectives
- B. Specific Programs and Research (List individual projects)
  - 1. Description
  - 2. Objectives
    - a. Is program meeting desired objectives?
    - b. What criteria are used to evaluate the program?
- C. Procedures
  - 1. Identification of problem areas and research needs -- How are priorities assigned?
  - 2. Specific actions to abate and control noise
  - 3. Procedures for coordination with other Federal agencies
  - 4. Extent of inhouse capability -- include consultant usage
  - 5. Proposed new procedures to upgrade programs
- D. Future Program Proposals and Objectives

III. Fiscal

- A. Current Program
  - 1. Real property value of facilities and equipment used for noise programs
  - 2. Current operating budget (FY 72)
    - a. Direct operating costs
    - b. Indirect-estimate overhead and maintenance

3. Personnel

a. Current authorizations by type and classification

b. Salary totals for program operation and contract management

4. Contracts, grants, loans and subsidies (see Sec. II B)

a. Percent completion

b. Funding by project

c. Total research expenditures

B. Past and Future Programs

1. Past programs

a. Expenditures for past 3 to 5 years

b. Facilities aquisitions for past 3 to 5 years

2. Future program plans

a. Projected facilities costs

b. Projected personnel levels

IV. Regulation and Certification

A. Authority and Responsibilities

B. Actions Taken to Implement Regulation and Certification Requirements

Appendix B

DETAILED AGENCY RESPONSES TO INQUIRY

THE NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
WASHINGTON, D.C. 20546

REPLY TO
ATTN OF PA

August 30, 1971

Dr. Alvin F. Meyer, Jr.
Director
Office of Noise Abatement and Control
Environmental Protection Agency
Washington, D. C. 20480

Dear Dr. Meyer:

In response to your letter of July 30, 1971, I have enclosed material descriptive of the various noise abatement and control programs of the National Aeronautics and Space Administration. This should fulfill the requirements of the questionnaire.

Although the NASA is not an environmental agency, among its missions* is the development of aeronautics technology. One program in this category is an aircraft noise research program having the objective of improving the technology of aircraft noise reduction. This program is composed of five elements; Source Noise Research (by far the largest), Propagation Noise Research, Receptor Noise Research, Sonic Boom Research, and Approach Trajectory Modification. Each of these programs is described in Enclosure 1, which also includes the corresponding funding figures and a list of contractual efforts.

Enclosure 2, minutes of the February 25, 1971, meeting of the Noise Research Panel of the Interagency Aircraft Noise Abatement Program, contains a more detailed description of many of the program elements, along with material descriptive

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*The National Aeronautics and Space Act of 1958, as amended (P.L. 85-568, 72 Stat. 426).

of the corresponding programs of the Department of Transportation, the military services, and a number of industrial firms. Enclosures 1 and 2 provide NASA funding data for the three fiscal years 1970, 1971, and 1972, except that Enclosure 2 does not include data for Sonic Boom Research. Furthermore, the Approach Trajectory Modification program is included in the category, Propagation Research, in both Enclosures 2 and 3. Enclosure 3 provides a broader look at the Federal aircraft noise research program, and FY 1970 Sonic Boom Research funding data are available here.

Definition of the FY 1973 noise research program is impossible at this time because we are just beginning the budget cycle. In general, however, we expect no major change in either scope or funding of the program.

In-house noise research programs are carried out in a number of NASA facilities. Those facilities devoted exclusively or primarily to noise research are listed in Enclosure 4, and their total capitalized cost (facilities and special-purpose equipment) is approximately $5 million. We have recently let design contracts leading to the eventual construction of the Aircraft Noise Reduction Laboratory, likely to go into operation in late 1972. This facility, with construction and equipment estimated to cost about $5.8 million, will provide a research facility capable of directly attacking the problem of noise created by aircraft, including fundamental research in the generation and physical measurement of noise, human reactions to noise, and techniques for noise reduction.

In addition to the noise research program, NASA maintains an agency-wide hearing conservation program for the protection of all employees at NASA installations. The overall agency effort devoted to work place surveillance, audiometric testing, and medical attention is approximately 1 to 1.5 man-years. All NASA installations utilize conventional survey and recording equipment along with audiometers and sound control booths. For the most part, this effort is executed by professional industrial hygienists, industrial nurses, and physicians.

The damage risk criteria used in NASA to determine hazard to personnel exposed to noise are the Walsh-Healey criteria. There is also an agency handbook which provides procedural information on the subject of "Hearing Conservation in Noise Exposure."

I hope the information provided here will meet your requirements. If additional information is necessary, please let me know.

Sincerely yours,

Nathaniel B Cohen

Nathaniel B. Cohen
Director, Policy Analysis

Enclosures (4)

8/16/71

ENCLOSURE 1

NASA AIRCRAFT NOISE RESEARCH

The NASA conducts a continuing research and development program to improve the technology of aircraft noise reduction. The noise reduction program is very broad, covering the areas of source noise, propagation noise and receptor noise. In addition the program covers research on sonic boom and on approach trajectory modification. The program is centered around a large in-house effort conducted at the various NASA Centers. The in-house effort is supplemented by a contractual program effort involving many universities and industrial organizations. The noise research program is described in some detail in the minutes of the meeting of the Noise Research Panel of the Interagency Aircraft Noise Abatement Program (IANAP), February 25, 1971. The IANAP has been a major source for coordination of noise research being conducted within the United States. For convenience a summary of the programs underway is given below along with a list of contractual efforts. Following that is a discussion of the resources allocated to the noise program.

Source Noise Research

Rotating blade noise: - The generation and prediction of rotating blade noise is important for various propulsion units such as propellers, helicopter rotors, fans, compressors, and turbines. Tests of a multistage laboratory compressor to determine noise loads on the compressor case near the rotors and propagation of noise through the blade rows is being supplemented with analytical studies to predict oscillating pressure loads and the effects of inflow angle on noise generation. Both small-scale and full-scale fan tests are being conducted to provide information on fan noise generation and its alleviation.

Acoustic Treatment: A broad experimental and theoretical research program is underway to determine the basic behavior of duct lining materials, their application to aircraft, and associated operating problems. Materials with suitable acoustical, structural, and aerodynamic properties are being studied, along with special flow control methods such as inlet flow choking by either variable geometry or localized injection of fluids for flow control. Flight programs have demonstrated noise reductions of up to 15 EPNdB through the use of fan duct acoustic treatment, and this technology is being expanded to the turbine exhaust region.

Jet Noise: Jet exhaust noise research involves both nozzle configurations and flow considerations. The basic acoustic characteristics of slot nozzles of the type used in ground effect machines are being studied. Other devices and methods include flow shielding to radically change the noise radiation pattern, and the addition of various substances to the jet flow to alter the noise generation and radiation characteristics.

Quiet Engine: An Experimental Quiet Engine program is being conducted for the NASA Lewis Research Center by the General Electric Company under Contract NAS3-12430. The scope of the program is to design, construct and test two experimental full-scale turbofan engines using advanced design features for noise reduction. The goal is to achieve 15 to 20 EPNdB less noise than existing engines of the same size (e.g. the Pratt & Whitney JT3D engines in the Douglas DC-8 and Boeing 707 aircraft).

Component tests that have been made to date have shown that the noise design goals are likely to be achieved. The first engine has now been assembled and testing has begun. Following performance and acoustic tests by the contractor, the engine will go to Lewis Research Center where additional noise tests will be made both with and without a nacelle designed to achieve the final part of the noise reduction goal. The tests at Lewis will begin in the Spring of 1972.

Propagation Noise Research

Studies are being conducted to closely correlate flyover noise data recordings, aircraft position information and atmospheric propagation losses over the audible frequency range. Meteorological studies of the lower 1000 meters of the atmosphere in several representative locations in the U.S.A. are underway to provide a statiscal representation of temperature, humidity, and wind gradients.

Receptor Noise Research

The NASA is sponsoring research to determine noise induced inner ear damage using frequency, intensity and exposure time as variables. It is also studying whether or not aircraft noise induces performance degradation to aircrews and the influence of subsonic aircraft noise on sleep.

Sonic Boom Research

The Ames and Langley Research Centers are engaged in a coordinated program involving both theoretical and experimental studies of the effects of airplane configuration and flight conditions on the production of sonic boom and on methods for their minimization. The general objective is to develop criteria which can be used to design high performance supersonic and hypersonic aircraft which will generate low sonic boom pressures on the ground in the vicinity of the flight path.

A broad program of investigation of the effects of atmospheric nonuniformities, wind, turbulence, etc., on sonic boom wave forms and also on means of producing a realistic and repeatable sonic boom environment for test purposes is underway.

The sonic boom affects both people and structures, and research is underway to understand these effects, to determine possible deleterious effects, and to develop efficient methods of protecting both people and structures from such effects.

Approach Trajectory Modifications

The NASA and FAA have demonstrated the noise reduction potential of steep two-segment approaches for current jet transports. NASA is planning research in this area to establish the feasibility of adopting such approaches and the avionics required. The noise reduction potential and feasibility of alternate approaches will also be studied.

Contract Efforts

Following is a list of contracts and grants that form a part of the NASA noise reduction program. An indication of funding in FY 70 and FY 71 is given. The determination of contracts to be awarded in FY 72 is subject to change and can be provided at a future time.

SUMMARY OF NASA-OART NOISE RESEARCH

The resources (funding and professional manpower) required to carry out the program just described are given in the following table: The funding consists of Research and Development dollars and R&PM (i.e. Research and Program Management) dollars. In turn the R&D dollars are spent in-house for purchase of test equipment and instrumentation, and for research contracts.

	FUNDING ($,K)	
	FY 1971	FY 1972
In-House R&D Funding	3,336	5,400
Contract R&D Funding	11,146	12,600
Source Noise	9,694	
Propagation Noise	45	
Receptor Noise	543	
Approach Trajectory	270	
Sonic Boom	594	
Total NASA/OART Noise R&D Funding	14,482	18,000
Total NASA R&PM Funding (Est. at 70K per PMY)	6,405	7,000
Total R&D and R&PM Funding	20,887	25,000

L[illegible]LEY RESEARCH CENTER

Source Noise

Contractor Contract Number	Title	Start Date	Estimated Completion Date	Funding, $	
				FY 70	FY 71
Lockheed Marietta, Georgia NAS 1-10472	Measurement of Sound Propagation in and Radiation from Finite-Length, Lined, Annular Ducts with Non-Uniform Mean Flow	11/70	7/72	$ 0	$175,000
Loughborough Univ. Loughborough, Leicestershire, England	Studies of Broadband Noise from Rotating Blades	1/71	1/74	$ 0	$ 33,000
Grant: NGR-52-140-002 - Cost sharing with British Ministry of Technology					
Univ. of Southampton Inst. of Sound & Vibration Southampton, England	The Noise of High-Speed Lifting and Propulsion Rotors	12/65	12/71	$ 0	$ 14,000
Grant: NGR 52-025-002					
Bolt, Beranek, & Newman Canoga Park, Calif. NAS 1-9559-6	Jet Noise Reduction Study	8/70	11/70	$ 0	$ 5,000
Old Dominion Univ. Hampton, Virginia NAS 1-9434	Study, Design, and Fabrication of Ejector Models and Werodynamic Duct Work Models	11/69	7/71	$23,000	$ 3,000
Lockheed Burbank, Calif. N00123-70-C-0906 (Navy Contract)	Airframe Noise	1/70	4/70	$22,000	$ 0

LANGLEY RESEARCH CENTER

Source Noise

Contractor Contract Number	Title	Start Date	Estimated Completion Date	Funding, $ FY 70	FY 71
LTV Anaheim, Ga. NAS 1-10021	Tone Burst Impedence Tube	5/70	7/71	$81,000	$ 0
J. Kriegler Langley, Va. L-50150	Propeller Theory	4/70	12/70	$ 2,000	$ 0
Boeing Seattle,Washington NAS 1-9622	Tailpipe Treatment	3/70	5/71	$371,000	$ 0
Boeing Seattle,Washington NAS 1-7129	Nacelle Acoustic Treatment	5/68	5/70	$186,000	$ 0
Syracuse Univ. Syracuse, N.Y. NGL 33-022-082	Supersonic Jet Noise	6/68	5/72	$102,000	$ 0
New York Univ. New York, N.Y. NGL 33-016-128	Jet Additives	12/67	6/72	$100,000	$ 0
Dynatech Corp. Cambridge, Mass. NAS 1-9309	Liquid Injection	3/70	2/71	$ 39,000	$ 0
Bolt,Beranek,& Newman Canoga Park, Calif. NAS 1-9883	Fluctuating Rotor Forces	3/70	5/71	$105,000	$ 0

LANGLEY RESEARCH CENTER

Source Noise

Contractor Contract Number	Title	Start Date	Estimated Completion Date	Funding, $ FY 70	FY 71
Penn State Univ. NGL 39-009-121	Jet Noise	1/69	1/73	$70,000	$ 0
Univ. of Tenn NGL 43-001-075	Jet Flap Noise Suppression	1/69	1/73	$34,000	$ 0
Univ. of Virginia NGR 47-005-147	Quasi-Linearization Techniques for Analysis of Compressor Noise	5/70	5/71	$13,000	$ 0

LANGLEY RESEARCH CENTER

Propagation Noise

Contractor Contract Number.	Title	Start Date	Estimated Completion Date	Funding, $	
				FY 70	FY 71
Bolt, Beranek, & Newman Canoga Park, Calif. NAS 1-9559-3	Duct Noise Propagation	4/70	8/70	$ 2,000	$ 0
Bolt, Beranek, & Newman Canoga Park, Calif. NAS 1-9559-8	Test Plan for Sound Propagation	10/70	1/71	$ 0	$ 9,945
Boeing Seattle, Washington NAS 1-10272	Noise Propagation Analysis	10/70	5/71	$ 0	$35,000
ESSA Silver Spring, Md. L-37584	Atmospheric Effects	10/69	3/71	$15,000	$ 0
Allied Research Baltimore, Md. NAS 1-9837	Atmospheric Effects	3/70	6/71	$43,000	$ 0
Bolt, Beranek, & Newman Canoga Park, Calif NAS 1-6168	Air to Ground Propogation	6/68	2/70	$ 9,000	$ 0

LANGLEY RESEARCH CENTER

Receptor Noise

Contractor Contract Number.	Title	Start Date	Estimated Completion Date	Funding, $ FY 70	 FY 71
University of Ill. Urbona, Illinois NGL 14-005-074	Studies on Auditory and Vestibular End Organs and Brain Stem Nuclei	10/70	9/73	$140,000	$140,000
Indiana University P.O. Box F Bloomington, Ind. NGR 15-003-077	Experimental Study of Hearing Loss and Inner Ear Damage after Exposure to Sounds	7/69	6/71	$ 30,000	$ 30,000
Sikorsky Aircraft Stratford, Conn. NAS 1-10144	Study of Effects of Noise	7/70	9/71	$ 0	$ 60,000
Tracor Inc. Austin, Texas NAS 1-10216	A study of Community Reaction to Jet Noise Around Small City Airports	8/70	11/71	$ 0	$187,000
North Carolina State Univ. Raleigh, N.C. Grant: NGL 34-002-055	Human Factors Aspect of Noise and Vibration	2/67	6/73	$30,000	$ 40,000
North Carolina State Univ. Raleigh, N.C. Grant: NGL 34-002-095	Acoustic Energy Effects on Sleep and Human Performance	3/69	8/73	$ 0	$ 51,000
Wyle Laboratories Hampton, Virginia NAS 1-9257	Study of Evaluation and Refinement of Aircraft Noise Rating Techniques	7/69	12/70	$ 0	$ 14,000

LANGLEY RESEARCH CENTER

Receptor Noise

Contractor Contract Number.	Title	Start Date	Estimated Completion Date	Funding, $ FY 70	Funding, $ FY 71
Audio Shuttle Norwalk, Conn. NAS 1-10418	Audiometric Room - Design and Purchase	10/70	3/71	$ 0	$ 21,000
Amer.Inst.for Res. Pittsburgh, Pa. NAS 1-9854	Performance Battery	3/70	3/71	$100,000	$ 0
Stanford Res.Inst. Menlo Park, Calif. NAS 1-10017	Comparison of Field & Lab Noise	5/70	11/71	$178,000	$ 0
Stanford Res.Inst. Menlo Park, Calif. NAS 1-6855	Overflight Subjective Response	12/66	6/69	$ 16,000	$ 0
William & Mary Williamsburg, Va. NAS 1-9461	Noise Effects on Vision	8/69	8/72	$ 25,000	$ 0
Boeing, Vetrol Philadelphia, Pa. NAS 1-10,044	VTOL Noise Acceptability	5/70	7/71	$ 85,000	$ 0

LEWIS RESEARCH CENTER

Source Noise

Contractor Contract Number	Title	Start Date	Estimated Completion Date	Funding, $ FY 70	 FY 71
General Electric Evendale, Ohio NAS 3-12430	Experimental Quiet Engine	7/69	5/73	69 - 70 - 71 - 72 - 73 -	4,500,000 4,900,000 7,000,000 4,700,000 300,000
Boeing Wichita, Kansas NAS 3-14321	Suppressors for Quiet Engine	7/70	12/71	$381,000	$350,000
Pratt & Whitney Hartford, Conn. NAS 3-10483	Research on the Aerodynamics and Acoustic Problems of High-Load, Low-Speed Fans	6/67	6/71	$389,000	$71,000
General Electric Evendale, Ohio NAS 3-14404	Study Program for Integral Lift Fan Engine	6/70	6/71	$243,000	$100,000
General Electric Evendale, Ohio NAS 3-14406	Study Program for Remote Lift Fan Engine	9/70	9/71	$ 0	$284,000

AMES RESEARCH CENTER

Source Noise

Contractor Contract Number	Title	Start Date	Estimated Completion Date	Funding, $ FY 70	Funding, $ FY 71
General Electric Evendale, Ohio NAS 2-5462	Lift Fan Noise Reduction	3/71	1/73	$400,000	$493,000
Bolt, Beranek and Newman Canoga Park, Calif. NAS 2-6206	Measurement of Noise in Wind Tunnels - Determine Free-Air Corrections	11/70	5/71	$ 10,000	$ 19,000
Bolt, Beranek, and Newman Canoga Park, Calif. NAS 2-5974	Fundamental Study of Aerodynamic Airfoil Noise with Serrated Leading Edges	5/70	5/71	$ 44,000	$ 55,000
Stanford University Palo Alto, Calif. and UCLA, Los Angeles, Calif. Grants in Preparation	Graduate Student Support for Fundamental Noise Research, Leading to PhD Thesis	Start FY 71 Estimated Compl. 3 years		$ 0	$245,000
Nielson Eng. & Res. Mountain View, Calif. NAS 2-6010	Study of Dynamic Pressures	6/70	9/71	$ 0	$ 62,000
ERO Associates Los Angeles, Calif. In negotiation	Rotor Stator Acoustic Interaction	1971	12 months	$ 0	$ 50,000

AMES RESEARCH CENTER

Source Noise

Contractor Contract Number.	Title	Start Date	Estimated Completion Date	Funding, $ FY 70	FY 71
Boeing Aircraft Seattle, Washington NAS 3-6344	Augmentor Wing Aircraft Design with Emphasis on Low Noise Generation	1/71	3/72	$ 0	$480,000
Dr. El Sum Burlingame, Calif. In Negotiation	Assess Use of Acoustic Holography to Define Aircraft Noise	4/71	9/71	$ 0	$ 20,000
RAO Associates Los Angeles, Calif. NAS 2-5730	Leaned Vane Research	11/69	3/71	$35,000	$ 0

Propagation Noise

AMES RESEARCH CENTER

Contractor Contract Number	Title	Start Date	Estimated Completion Date	Funding, $	
				FY 70	FY 71
American Airlines Tulsa, Oklahoma	Acoustic Signatures - Steep Decent Flight Programs Aircraft Lease	FY 71	3 months	$ 0	$270,000

Procurement in process

APPENDIX

NASA NOISE RESEARCH GRANTS AND CONTRACTS

HEADQUARTERS

Source Noise

Contractor Contract Number	Title	Start Date	Estimated Completion Date	Funding, $ FY 70	Funding, $ FY 71
General Electric Schenectady, N.Y. NASw-1784	Supersonic Jet Exhaust Noise	7/26/68	8/31/71	$35,000	$35,000
General Electric Evendale, Ohio NASw-1922	Noise Generation From Large Fans	10/15/69	6/30/72	$49,000	$40,000
Stanford Res. Inst. Palo Alto, Calif. NASw-1938	Study of the Structure of Jet Turbulence Producing Jet Noise	8/05/69	6/31/71	$58,000	$40,000
University of Mass. Amherst, Mass. NGR22-010-063	Real Fluid Effects in Compressor Noise	6/01/70	5/31/71	$15,000	$15,000
United Aircraft Hartford, Conn. NASw-1908	Broadband Noise of Axial Compressor	7/11/69	6/30/72	$ 0	$40,000
Stanford University Palo Alto, Calif. NGL05-020-275	Fluid Mechanics of Edgetones	1/01/70	12/31/72	$25,000	$25,000
California Inst.Tech. Pasadena, Calif.	Jet Noise Generation and Suppression	6/30/71	5/31/72	$ 0	$40,000
Cornell Aeronautical Lab. Ithaca, N.Y. NASw-2091	Analysis of Transonic Compressor Flow	9/30/70	8/31/71	$34,000	$ 0

APPENDIX

NASA SONIC BOOM RESEARCH GRANTS AND CONTRACTS

Langley Research Center

Source Research

Contractor Contract No.	Title	Starting Date	Estimated Completion Date	Funding ($K) FY 70	Funding ($K) FY 71
Aerospace Corp. Los Angeles, Calif. (NAS1 - 10051)	A Study of the Validity of the Heat Field Concept of Sonic Boom Alleviation	6/70	9/71		108

The purpose of this study is to determine if the release of large quantities of heat which would alleviate the sonic boom can be practically applied.

Path Research

Contractor Contract No.	Title	Starting Date	Estimated Completion Date	Funding ($K) FY 70	Funding ($K) FY 71
E.G.&.G. Co. Albuquerque, N. Mex. (NAS1 - 9284)	Propagation of Sonic Boom Through Turbulence	6/69	11/70		4

This study attempts to extend the scattering theory of Crow by use of a multiple scattering theory. Included will be an evaluation of the theory of Tatarski with modifications as necessary.

Contractor Contract No.	Title	Starting Date	Estimated Completion Date	Funding ($K) FY 70	Funding ($K) FY 71
Mass. Inst. of Tech. Cambridge, Mass. (NGL 22-009-334)	Atmospheric Effects on Sonic Boom Pressure Wave Forms	9/70	9/71	40	

A theory is being investigated which relates spikes on boom signatures to a mechanism consisting of simultaneous focusing and diffraction due to an inhomogeneous atmospheric layer. The potential of explaining signature rounding by this mechanism is also being investigated.

Langley Research Center

Path Research

Contractor Contract No.	Title	Starting Date	Estimated Completion Date	Funding ($K) FY 70	Funding ($K) FY 71
Mt. Auburn Res. Assoc., Inc. Cambridge, Mass. (NAS1 - 10276)	A Numerical Method to Determine the Pressure in a Sonic Boom Focus	12/70	3/72		96

Studies have just gotten underway to examine in detail the sonic boom focus phenomena.

Contractor Contract No.	Title	Starting Date	Estimated Completion Date	Funding ($K) FY 70	Funding ($K) FY 71
General American Transportation Corp. Niles, Illinois (NAS1 - 9252)	Sonic Boom Simulation	6/69	8/70	10	

Receptor Research

Contractor Contract No.	Title	Starting Date	Estimated Completion Date	Funding ($K) FY 70	Funding ($K) FY 71
Stanford Res. Inst. Menlo Park, Calif. (NAS1 - 10528)	Comprehensive Study of the Psyco-physiological Reactions to Sonic Booms and their Effects on Sleep and Startle	2/71	3/72		82

Tests subjects will be evaluated by motor performance testing while performing under varied acoustic background including aircraft noise and simulated sonic booms. In addition, the effects of the same noises on the sleep of subjects will be studied in a specially designed sleep test room.

Langley Research Center

Receptor Research

Contractor Contract No.	Title	Starting Date	Estimated Completion Date	Funding ($K) FY 70	Funding ($K) FY 71
General Applied Sci. Lab., Inc. Westbury, N. Y. (NAS1 - 9594)	Acoustic Response to Various Wall and Room Configurations	11/69	12/70	95	
The principal direction of these studies is to determine the effects on structures of low-level repeated sonic boom exposures.					
Mass. Inst. of Tech. Cambridge, Mass. (NGL 22-009-135)	Response of Building Structures to Environmental Noise of Seismic, Acoustics, and Aerodynamic Origin	10/70	9/71	35	
The object of this investigation is to develop an analytical procedure for predicting the random response of plate-like structures resting on soil and subject to seismic noise of aerodynamic origin.					
J. H. Wiggins Co. Palos Verde, Calif. (Pending)	Theoretical Study of Window Glass Breakage with Sonic Boom Loads				80

APPENDIX

NASA SONIC BOOM RESEARCH GRANTS AND CONTRACTS

Ames Research Center

Source Research

Contractor Contract No.	Title	Starting Date	Estimated Completion Date	Funding ($K) FY 70	Funding ($K) FY 71
Aerophysics Res. Corp. Bellevue, Washington (NAS2 - 4880)	Studies of Sonic Boom and Drag Optimization	9/69	12/70	70	15

This study is directed toward the development of an analytical method for calculating supersonic flow-fields about arbitrary configurations. The method features a three-dimensional distribution of singularities on the configuration.

Path Research

Contractor Contract No.	Title	Starting Date	Estimated Completion Date	Funding ($K) FY 70	Funding ($K) FY 71
Aerophysics Res. Corp. Bellevue, Washington (Pending)	Development of Hypersonic Theory for the Sonic Boom				10

The purpose of this study is to extend sonic boom theory into the hypersonic range.

APP IX

NASA SONIC BOOM RESEARCH GRANTS AND CONTRACTS

NASA Headquarters

Source Research

Contractor Contract No.	Title	Starting Date	Estimated Completion Date	Funding ($K) FY 70	Funding ($K) FY 71
New York Univ. New York, NY (NGL 33-016-119)	Investigation of Optimum Aircraft Configuration for Sonic Boom Reduction	8/70	7/71	55	55

The purpose of this investigation is to determine whether or not substantial reductions in sonic boom may be obtained by novel aircraft configurations, to evaluate effects of atmospheric conditions and diffraction of sonic boom signatures from structures and topographical configurations.

Path Research

Contractor Contract No.	Title	Starting Date	Estimated Completion Date	Funding ($K) FY 70	Funding ($K) FY 71
Columbia Univ. New York, NY (NGL 33-008-098)	Theoretical Study of the Superboom	8/70	8/71	37	29

The objective of this research is to understand the basic mechanism of the superbooms caused by nonuniform motions of the aircraft and refractive effects of temperature gradients in the atmosphere.

Contractor Contract No.	Title	Starting Date	Estimated Completion Date	Funding ($K) FY 70	Funding ($K) FY 71
Cornell Univ. Ithaca, NY (NGL 33-010-054)	Analysis of Turbulence Effects on Sonic Boom Transmission	9/70	8/71	30	30

This sonic boom investigation comprises a theoretical investigation into the validity of the basic theory, the extent of the mid-field region, atmospheric effects and sonic booms of hypersonic aircraft.

NASA Headquarters

Path Research

Contractor Contract No.	Title	Starting Date	Estimated Completion Date	Funding ($K) FY 70	Funding ($K) FY 71
Princeton Univ. Princeton, NJ (NGL 31-001-119)	Investigation of Nonlinearity, Caustic and Diffraction in Wave Propagation	10/70	10/71	30	30

A number of theoretical problems associated with sonic boom prediction will be investigation; specifically, the nonlinear behavior of an N-wave at a caustic, the extension of nonlinear theory to geometrical acoustics and sonic boom signatures within a shadow region.

Contractor Contract No.	Title	Starting Date	Estimated Completion Date	Funding ($K) FY 70	Funding ($K) FY 71
Aeronautical Res. Inst. of Sweden Bromma, Sweden (NGR 52-120-001)	Investigation of Nonlinear Effects on Sonic Boom Generation	2/71	2/72	60	45

The purpose of this work is to further understanding of nonlinear effects on the generation of sonic booms by means of theoretical and experimental investigations.

ENCLOSURE 4

NASA FACILITIES & EQUIPMENT DEVOTED EXCLUSIVELY OR PRIMARILY TO NOISE RESEARCH

LANGLEY RESEARCH CENTER, Hampton, Virginia

High Intensity Noise Facility (Bldg. 1221)
Low Frequency Noise Facility (Bldg. 1221A)
Psycho-acoustic Lab & Anachoic Noise Facility
  (Bldg. 1218 & 1218A)
Rotor Test Tower
Instrumentation Vans
Jet Engine Noise Test Stand

LEWIS RESEARCH CENTER, Cleveland, Ohio

Quiet Fan Facility (Bldg. 90)
Aircraft Noise Laboratory (Bldg. 4)

DEPARTMENT OF DEFENSE

OFFICE OF THE ASSISTANT SECRETARY OF DEFENSE
WASHINGTON, D. C. 20301

HEALTH AND ENVIRONMENT

13 SEP 1971

Dr. Alvin F. Meyer, Jr.
Director, Office of Noise Abatement and Control
Environmental Protection Agency
Washington, D. C. 20460

Dear Doctor Meyer:

The Department of Defense is pleased to submit the attached information requested in your letter of 30 July 1971 on "Federal Noise Programs". Each of the Military Departments have followed the format you requested where possible. Specific questions concerning the attachments should be referred to the appropriate Military Department.

Sincerely,

M.G. Patton, M.D.
Acting Deputy Assistant Secretary
(Environmental Quality)

3 Attachments
a/s

DEPARTMENT OF THE ARMY

NOISE PROGRAMS INFORMATION

The noise programs being accomplished within the Department of the Army are reflected by the following information. Those sections of the suggested format not applicable to the activities of the agencies were omitted, and slight modifications of format were performed where desirable for clarity.

1. I. Organizational

A. Agency - Office of the Chief of Research and Development.

B. Authority for Funding - Contract # DAHC19-70-C-0022.

II. Functional

A. Study Objective - The Federation of American Societies for Experimental Biology (FASEB), a nonprofit group, is under OCRD contract to conduct a review of the adverse effects of noise in the military.

B. Specific Research

1. Description - The FASEB effort, "A Review of the Adverse Biomedical Effects of Sound in the Military Environment," is a study of the problem area by an ad hoc group. This is a one-time contract with all funds paid from FY 70 appropriations. Primary emphasis is being placed on noise-induced hearing loss and the many variables that may affect the onset, nature, and severity of such hearing loss. Consideration is being given to the adverse effects of noise on the efficiency of the soldier in performing his duties. The potentially adverse effects of excess sound on other than hearing loss are also being considered.

2. Objectives.

a. The objectives of this study are to review current state-of-the-art knowledge concerning the adverse effects of sound in the military, to identify gaps in knowledge in this area, and to recommend future Army research to minimize the adverse effects of sound on the soldier. The study is on schedule and meeting desired objectives. A draft of the final report is now being prepared for distribution to participants in the study for their comments. A final report is expected by 30 December 1971.

b. No formal criteria are being used to evaluate the study; however, in addition to the OCRD contracting officer, representatives of various governmental and civilian agencies, who are considered experts in the field of hearing, provided informal input of pertinent information and opinions and systematic evaluation of these data during the course of the study.

C. Procedures

1. Priorities were assigned based upon hearing problems identified in the military. Priorities were revised when necessary based upon results received during the study.

2. Coordination with other Federal agencies was accomplished by participation of representatives of appropriate agencies in the ad hoc meetings.

III. Fiscal

A. Current Program - Awaiting final report on study in December 1971.

B. Past and Future Programs

1. Past expenditure: one-time expenditure of $82,000 from FY 70 funds.

2. Future program plans depend upon the results of this study. When completed, this study will integrate the opinions of experts and outstanding workers in the field of hearing. It is expected to provide information and guidance for future research by the Army in biomedical and behavioral sciences, as well as protective equipment in the development of improved weapons systems, communications systems, military vehicles, and aircraft.

2. I. Organizational

A. Agency - Office of the Chief of Engineers.

B. Legislative Requirements and Authority for Noise Function and Funding.

It is not anticipated that special legislation or funding will be required. The current practice is to include noise control as needed in our program with the authority and funding in the general program authorizations.

II. Functional

A. Overall Program Objectives

To perform the design and construction operations of the Corps of Engineers in a manner that noises generated will not be of such a magnitude or intensity as to adversely impact on the project workers or inhabitants of the surrounding area. Apply control measures to eliminate noise levels which could be expected to cause nuisances or adversely affect the physiological or psychological health of the area occupants.

B. Specific Programs and Research

Project No. 1

1. Description - Research Work Unit Entitled: Sound and Vibration Tolerance Limits Residential Areas. The objective of this research is to establish criteria for the location of artillery and other weapons firing ranges, test facilities and military airfields relative to residential areas in order to attenuate sound and vibration effects to tolerable levels. Attenuation techniques will also be developed.

2. Objectives

a. The program was just initiated in July 1971. To date it is meeting desired objectives.

b. The criteria used to evaluate work are:

(1) New or improved criteria developed.

(2) New or improved techniques for attenuation developed.

(3) Timeliness.

1. Description - Research Work Unit Entitled: Environmental Protection During Construction Activities. This research seeks to identify causes and effects of pollution (including noise) during and as a result of construction operations and to provide economical and reliable control criteria and methods for incorporation into Corps contract specifications and construction supervision.

2. Objectives

a. The program has been underway approximately 9 months and is continuing. A survey of the state-of-the-art in environmental protection during construction has been completed. The program is meeting objectives.

b. The criteria used to evaluate work are:

(1) New or improved contract criteria developed.

(2) New or improved techniques developed.

(3) Timeliness.

C. Procedures

1. Identification of problem areas and research needs -- How are priorities assigned?

Problem areas and research needs are determined by a Corps wide system (which system includes users and customers of the Corps) of problem identification and evaluation that is pursued continually with a complete re-evaluation of all research performed annually. Priorities are arrived at through a series of research priority questionnaires completed by Corps District and Division offices, OCE, and customers. Also taken into account are Department of Defense and national needs and priorities as stated formally and discerned informally, This activity is conducted by the Office, Plans Research and System Directorate of Military Construction.

2. Specific actions to abate and control noise.

The Corps of Engineers is responsible for the design and construction of installations and facilities for the Department of the Army, Department of the Air Force, Department of Defense Agencies and other government departments or agencies when requested to do so. Noise abatement and control is an integral part of the site planning, engineering design and construction practices in the performance of this responsibility. The methods of noise abatement and criteria for minimizing its effect are established in appropriate Army Regulations, Technical Manuals and Guide Specifications. Facilities which produce objectionable noise levels that cannot be effectively muted are sited in areas that are isolated from the built-up portion of the installation and adjoining residential developments. Noises generated by the operation of motors, engines, air compressors and other similar equipment are controlled by insulated housing, mufflers, sound absorption barriers and operating speed design. Construction noises are likewise controlled by the use of sound absorption barriers, equipment sheathing and other sound suppression devices. The effects of pile driving and blasting are minimized by the application of energy absorbers or dissipators or by performing these operations at such times that the nuisance effect will be minimized.

3. Procedures for coordination with other Federal agencies

   By participation in the program development of the Federal Construction Council of The Academy of Science and thru exchange of information with the Environmental Protection Agency, customer agencies and interdepartmental committees.

4. Extent of inhouse capability -- include consultant usage

   The inhouse capability with particular expertise in noise abatement is limited. When unusual or complex noise problems arise consultant service from other government agencies or from the private sector is obtained.

5. Proposed new procedures to upgrade programs.

   No major alterations to our current noise abatement program are planned until the Office of Noise Abatement and Control of the Environmental Protection Agency establishes standards and provides guidance concerning methods of implementation.

D. Future Program Proposals and Objectives

No action planned until guidance is obtained from the Office of Noise Abatement and Control of the Environmental Protection Agency.

III Fiscal

A. Current Program

1. Real property value of facilities and equipment used for noise programs.

The facilities and equipment provided for noise control are included in the overall cost of providing operating facilities and no estimate of the value of the noise control portion can be provided. A portion of the $25,000 described in IIIA2 will be allocated to this category.

2. Current operating budget (FY 72)

a. Direct operating costs $15,000 - Research described in II B.

b. Indirect-estimate overhead and maintenance $10,000 - as described in II B.

3. Personnel

a. Current authorization by type and classification.

No personnel specifically assigned to noise control.

b. Salary totals for program operation and contract management

None.

4. Contracts, grants, loans and subsidies.

None in the current program.

B. Past and Future Programs

1. Past programs

a. Expenditures for past 3 to 5 years.

(1) For Technical Manual, TM 5-805-9, Power Plant Acoustics issued December 1968 - cost $33,866.

(2) For Technical Manual, TM 5-805-4, Noise Control for Mechanical Equipment issued September 1970 - cost $30,000.

b. Facilities acquisitions for the past 3 to 5 years.

No identifiable costs for noise control.

2. Future program plans

a. Projected Facilities cost.

No specific budgeted costs.

b. Projected personnel levels.

No personnel with primary assignment to noise control program.

IV. Regulation and Certification

A. Authority and Responsibilities

It is not expected that additional authority will be required. It will be our responsibility to provide facilities and a program to abate noise in accord with the requirements established by the Office of Noise Abatement and Control of the Environmental Protection Agency.

B. Actions Taken to Implement Regulation and Certification Requirements - None until required to implement noise control regulations.

3. I. Organizational

A. Agency - US Army Medical Research and Development Command, Office of The Surgeon General.

B. Authority - AR 705-5 and AR 70-9.

II. Functional

A. Overall Program Objectives - To study the problem of noise in the US Army in terms of sources of noise, biomedical effects of noise, the populations at risk, and the means of reducing noise production, noise exposure, and advance physiological and psychological effects of noise.

B. Specific Programs and Research

1. Descriptions of Specific Programs

a. "Traumatic Origins of Hearing Loss" - The purpose of this project is to provide information that may allow a more precise screening of noise-susceptible individuals at the time of their induction and to evaluate devices and techniques for the protection of Army personnel during normal military operations.

b. "Auditory Perception and Psychophysics" - The purpose of this project is to identify and assess those factors which enhance or degrade the soldiers ability to attend to, perceive, and respond to simple and complex signals in the presence of various masking sounds; and to assess and improve the predictive value of certain models of the processes involved in the communication of auditory information and to use these models to predict auditory performance in military tasks.

c. "Army Aviation Audiometry Program" - The purpose of this program is to perform precision audiometric tests on a large sample of Army personnel to determine their status of hearing; to aid in the establishment of a more reliable audiometer calibration program, to support introduction of an MOS for operators of audiometer equipment, and to assist in development of a training program for these specialties.

d. "Acoustical Environment of Army Aviation Personnel" - This project has as its objectives the determination of noise levels, durations, and spectra of noise in which maintenance personnel are required to perform their duties and to maintain a record of the military noise environment with special emphasis on Army aviation.

e. "Effects of Distortion in Military Communication Systems" - The purpose of this investigation is to study distortion in these systems as it relates to type of microphone, environmental noise level, and intelligibility of military communication systems. Theoretical limits with idealized systems will be determined as well as recommended methods to improve present systems.

f. " Hearing Protection Devices Evaluation" - This study is to result in maintenance of readily available data, recorded under ASA standardized procedures, of the attenuation offered by standard helmets, earmuffs and ear plugs used by various personnel; and to estimate the protective properties of prototype equipment that will be considered for use by Army personnel.

g. "US Army Aircraft Vibrations Study" - The objective of this study is to make a survey of the vibration spectra in US Army aircraft as they are affected by noise reduction characteristics of soundproofing material.

h. "Determination of the Extent of Noise Induced Hearing Loss in the Army" - The purpose of this project is to determine how extensive decreased auditory acuity is among US Army personnel, as it relates to age, sex, race, MOS, history of noise exposure, and other factors. This will greatly facilitate better execution of the Hearing Conservation Program under the auspices of The Surgeon General.

2. Objectives

a. All programs are meeting desired objectives. These are principally on going programs requiring continued input as missions, materials, and other factors change with time. For example, as new aircraft are developed, each must be evaluated for noise hazards. Each successive segment of the various program has met desired objectives.

b. These programs are evaluated by continual internal review by the investigators and their superiors; by review by the headquarters monitoring officers, and by repeated exposure of protocols and results to such external means of review as publications in the open literature, presentations at scientific meetings, liaison with the NAS-NRC Committee on Hearing Bio-Acoustics, and Biomechanics; and coordination with the NATO Advisory Group on Aerospace Research and Development.

c. Procedures

(1) Problem areas and research needs are identified primarily through determination of operational requirements. Priorities are then assigned principally in consonance with operational priorities.

(2) Specific actions to abate and control noise sources are the primary responsibility of agencies other than the Medical Research and Development Command. Medical guidance is provided these agencies to the fullest possible extent consistent with established policies, directives and other controls. Direct medical action has, therefore, been aimed at control of exposure rather than limitation of noise production, although noise abatement at the source is the ultimate goal. The medical programs to limit exposure are functions of OTSG agencies other than USAMRDC on an informal basis between various investigators and laboratory commanders and through such means as the NAS-NRC Committee on Hearing, Bioacoustics and Biomechanics.

(3) Capability for in-house research in bioacoustics is excellent. Facilities, equipment, and expertise

are on hand to determine the parameters of the noise hazardous environments, the psychological and pathophysiological effects of these hazards, the effects on operational capability, and the evaluation and operational impact of hearing protective devices. Nationally and internationally recognized specialists in bioacoustics are available through various means, including formal liaison with the NAS-NRC Committee on Hearing Bioacoustics and Biomechanics.

(4) Future Program Proposals and Objectives - Future research plans and objectives will be designed to meet operational requirements. Anticipated work will attempt to further evaluate the hazards, the populations at risk, and the preventive, protective, and therapeutic measures of greatest value in combating noise hazardous environments.

III. Fiscal

A. Current program

1. Real property value of facilities and equipment, $525,000.

2. Current operating budget (FY 72).

a. Direct Costs - $352,400.

b. Indirect Costs - $111,900.

3. Personnel

a. Current authorizations

1 GS-15, Specialist in bioacoustics.

2 GS-13, Research psychologists (Code 180).

1 GS-07, Research Assistant.

2 04 Research psychologist, (MOS 8430).

6 enlisted Science and Engineering research assistants.

b. Salary totals (Civilian personnel), $95,000.

4. Contracts and related items: "Development of a New Generation Noise Cancellation Microphone". Objective: to reduce the noise level in Army Communications Systems.

Eighty percent complete. Funding level, $40,000.

B. Past and Future Programs

1. Past programs

a. Expenditures: FY 69 - $283,000
FY 70 - $271,900
FY 71 - $327,700

2. Future Program Plans

a. Projected facilities Costs: $400,000

b. Projected personnel levels: Increase of present personnel levels by 100%.

IV. Regulation and Certification

A. Authorities and Responsibilities - AR 705-5 assigns to The Surgeon General responsibility for RDTE of Medical Material and related items, and for medical aspects of other developments in the total RDTE program.

B. Actions taken to Implement Regulation and Certification Requirements - The RDTE responsibilities of The Surgeon General are fulfilled through the activities of the US Army Medical Research and Development Command and its subordinate units by means of continuing research activities which are designed to meet operational requirements and subjected to continual review at all levels of command to insure proper fulfillment of all commitments.

4. I. Organizational

A. Agency - Army Environmental Hygiene Agency and the Environmental Health Engineering Services, Office of The Surgeon General.

B. Authority

1. AR's 40-4 and 40-5.

2. Title 5, United States Code, Sec, 150 - Army Federal Civilian Employee's Health Service.

II. Functional

A. Overall Objectives

1. Assure that all eligible personnel (military and civilian) are physically, mentally, and psychologically suited to their work, and that their physical and mental health and well-being are maintained during service or employment.

2. Determine that the work environment for noncombatant areas is safe, hygienic, and wholesome.

3. Reduce the economic loss occasioned by physical inefficiency, sickness, and injury of military personnel and civilian employees.

B. Specific Programs

1. Hearing Conservation Program - The objective of the Army's Hearing Conservation Program is to prevent occupational loss of hearing due to noise. The primary sources of noise in the military environment being impulsive noise from the firing of small arms and artillery and steady noise from aircraft, combat vehicles, power generators and other industrial or military activities. The program involves:

   a. The identification, measurement and evaluation of noise hazards.

   b. The reduction of noise at its source by engineering, or operational controls.

   c. The use of hearing protective devices to attenuate noise levels before they reach the inner ear whenever noise levels exceed 90 dB for steady noise and 140 dB for impulsive noise.

   d. Audiometric surveillance of exposed personnel.

   e. Command emphasis, supervision, and health education. Further discussion of the conservation of hearing program is contained in the TB Med 251, Noise and Conservation of Hearing.

2. Objectionable Noise - To determine the nature and extent of noise levels to evaluate the environmental impact from various US Army sources. These studies consider the effects of noise to individuals on military installations and the surrounding environments. A limited

number of studies have been conducted in this area to include an alleged community annoyance problem associated with gunfire noise from the Wildflecker training Area, West Germany and an evaluation of environmental impact of noise from aircraft operations at Fort Hood, Texas.

C. Procedures

1. Problem areas are identified through studies, staff visits, and complaints received by the various elements of the Army Medical Department. Priorities are assigned on the basis of need.

2. Specific actions to abate and control noise include the technical review and evaluation of nonmedical material to determine possible existence of health hazard due to noise. This is done in part by the review of military and federal specifications and Material Needs documents. In addition, sound level measurements and evaluations are made of equipment used or proposed for use by the Army and recommendations are made for the engineering and operational control of noise exposure. Coordination is made with Army Materiel Command and Combat Developments Command with regard to the control of noise in equipment which may be procured or developed.

3. Coordination with other Federal agencies is accomplished through informal contact by individuals of the Medical Department.

4. There are 85 individuals working in the Army's occupational health program at the US Army Environmental Hygiene Agency and the Environmental Health Engineering Services. It is estimated that they devote approximately 5% of their time in various aspects of hearing conservation. In-house consultants in acoustical engineering, bioacoustics, industrial hygiene, human engineering, audiology, otolaryngology and occupational medicine in the conduct of the program. Other resources include NAS-NRC and civilian consultants.

5. The hearing conservation program and noise abatement program have been a major effort in the Army for many years and will continue to be a major effort. The directives AR 40-5 and TB Med 251 are under revision. DA Cir 40-79 on Command Emphasis in Hearing Conservation

Programs has recently been distributed to the field. A bioacoustics division was established at USAEHA last year to assist commanders in establishing comprehensive hearing conservation programs, to assist in identifying noise hazardous equipment, and to contribute to the development of equipment which presents less of a noise hazard. It should be noted that 2,000,000 pairs ear plugs were issued last year to personnel.

D. Future Program Proposals and Objectives - Included in the Occupational Health Program Change Request (PCR) for FY 73-77, submitted on 5 February 1971, was a request for funds to expand the US Army Hearing Conservation Program by strengthening the Bio-Acoustics Division, US Army Environmental Hygiene Agency. It appears that these funds will be made available. This request provides for an increase of five persons for the Bio-Acoustics Division. Expansion of the USAEHA hearing conservation and noise abatement program also takes into account requirements for implementation of the program at installation level. To accomplish this, efforts are being made to assign an audiologist to each Class I installation where a preventive medicine officer is assigned, with primary responsibility for the maintenance of the installation hearing conservation program. This plan would require an addition of six audiologists each year until this staffing level is reached.

III. Fiscal

A. Current Program for US Army Environmental Hygiene Agency and the Environmental Health Engineering Services does not include the personnel and resources such as Armed Forces Examining and Entrance Stations, Federal Health Services, Ear, Nose and Throat Clinics and hospitals for which statistics are not currently available.

1. Real property value of equipment - $71,000.

2. Current operating budget (FY 72)

   a. Direct Costs - $47,000.

   b. Indirect Costs - $117,900.

3. Personnel - current authorizations include preventive medicine, occupational health, sanitary engineers, environmental sanitarians, and audiologists which total 85.

5. I. Organizational

A. Agency - US Army Materiel Command.

B. Legislative Requirements and Authority for Noise Function and Funding.

1. This command is unaware of any legislative requirements.

2. Authority for funding is from Department of the Army, Department of Defense and Congress, based on Army's missions and functions.

II. Functional

A. Overall Program Objectives

1. To lessen detection time and distance.

2. To improve communications, fire accuracy, operator capability.

3. To improve health conditions and minimize annoyance to personnel.

B. Specific Programs and Research - The following military projects are for noise reduction:

1. Noise Reduction for the D-7 Crawler Tractor (Commercial Item) Under Product Improvement Project 1-68-9-27:

$205,000 for in-house and contract efforts. (Contract to Caterpillar Co.).

2. Silencing systems for the 10 KW Turboalternator Program under Project 1G664717D589:

FY 71 - $99,000 Contract; $10,000 In-house; FY 72 - $10,000 In-house.

3. Sound Suppression for the 30 KW Gas Turbine Generator Set Under Project 1G663702DG11:

FY 71 - $6,000; and FY 72 - $6,000.

4. Silencing Provisions for MIL STD Generator Sets Under Project 1G664717D589:

FY 70 - $63,000 Contract; $50,000 In-house; FY 71 - $29,000 Contract; $50,000 In-house and FY 72 - $15,000 In-house.

5. Product Improvement for Compressor, Air 600 CFM, 100 PSI. Funds have been requested as shown:

   FY 73 - $100,000; FY 73 -$162,000 and FY 74 - $168,000.

6. Basic Research on Human Capabilities, Army Human Factors Engineering - FY 72 - $75,000.

7. Rotary Wing Aircraft Noise Reduction (To minimize aircraft detection time and distance):

   FY 71 - $320,000; FY 72 - $350,000; FY 73 - $400,000;
   FY 74 - $400,000; FY 75 - $400,000 and FY 76 - $400,000.

C. Procedures

1. Identification of Problem Areas and Research Needs - Priorities are assigned based on military needs.

2. Specific Actions to Abate and Control Noise.

   a. Control basic design.

   b. Muffle.

   c. Insulate.

   d. Baffle.

   e. Warning signs.

3. Procedures for Coordination with Other Federal Agencies.

   a. Routine liaison is maintained with Air Force and Navy.

   b. Selection and dissemination of pertinent publications.

D. Future Program Proposals and Objectives - See above listing of projects (Future programs would be revised to comply with future Federal legislation).

III. Fiscal

A. Current Program

1. See above listing of projects.

2. The number of personnel engaged in sound control work is estimated at one man year per $40,000 expenditure.

IV. Regulation and Certification

A. Army regulatory documents are:

1. Section III of Army Regulation, AR 40-5, Hearing Conservation Program.
2. HEL Standard S-1-63B.
3. TB Med 251.

Compliance with these documents is mandatory within Army. (Copies of these publications are enclosed for your information).

3 Incl
as

U.S. ARMY

HEL STANDARD S-1-63B

(Supersedes HEL Standard S-1-63A, June 1964)

MAXIMUM NOISE LEVEL
FOR ARMY MATERIEL COMMAND EQUIPMENT

Technical Specifications Office
Systems Research Laboratory

June 1965

HUMAN ENGINEERING LABORATORIES

ABERDEEN PROVING GROUND,
MARYLAND

74<

HEL Standard S-1-63B
(Supersedes HEL
Standard S-1-63A, June 1964)

MAXIMUM NOISE LEVEL FOR ARMY MATERIEL COMMAND EQUIPMENT

Robert F. Chaillet	Georges R. Garinther
Technical Specifications	Acoustical Research
Office	Branch

APPROVED: John D. Weisz
JOHN D. WEISZ
Technical Director
Human Engineering Laboratories

U.S. Army Human Engineering Laboratories
Aberdeen Proving Ground, Maryland

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I. INTRODUCTION

1. The data contained within this standard reflect the official position of the U.S. Army Human Engineering Laboratories and supersede all other data from these laboratories pertaining to the subject of this standard.

2. Human Engineering Laboratories (HEL) standards are issued for use by the major subordinate commands of the Army Materiel Command (AMC) in the area of human factors engineering.

3. HEL standards provide guidance to the major subordinate commands of AMC for the inclusion of human factors engineering requirements in research and development or procurement contractual documents.

4. HEL standards will serve as the basis for a human factors engineering evaluation by the Human Engineering Laboratories in accordance with AMCR 10-4.

II. SCOPE

1. This standard establishes the maximum noise level permitted at personnel occupied spaces of equipment designed, developed or procured by AMC.

2. This standard establishes the testing requirements for determining conformance to the maximum noise level permitted.

3. This standard is not intended for application as an industrial standard. Its use shall be limited to military equipment.

4. This standard is not to be considered as a hearing damage risk criterion.

III. APPLICABLE DOCUMENTS

Reproduced from best available copy.

1. The documents cited in this section form a part of this standard to the extent specified herein.

a.	ASA Z24.10-1953	Octave-Band Filter Set for the Analysis of Noise and Other Sounds
b.	ASA S1.1-1960	Acoustical Terminology
c.	ASA S1.6-1960	Preferred Frequencies for Acoustical Measurements
d.	ASA S1.4-1961	General Purpose Sound Level Meters

2. Applications for copies of these documents should be addressed to:

American Standards Association
10 East 40th Street, New York 16, New York

VI. DEFINITIONS

1. Definitions of acoustical terms that do not appear in this section are in accordance with ASA S1.1-1960.

2. Decibel (dB) Reference Level is 0.0002 microbar.

3. Impulse Noise is a non-periodic variation in atmospheric pressure which may completely be described by its pressure vs time history. It has a positive pressure envelope duration of less than 1,000 milliseconds and a peak to root mean square value greater than 10 dB.

4. Positive Peak Sound Pressure Level is the highest instantaneous pressure achieved (expressed in dB or in PSI).

5. Positive Pressure Duration is the time required for the pressure wave to rise to its first positive peak and to return momentarily to ambient.

6. *Positive Pressure Envelope Duration* is the time required for the pressure wave to rise to its highest positive peak and to decrease to and remain 20 dB below this highest peak.

7. *Small Arms* - all arms, including automatic weapons, up to and including caliber .60 and shotguns.

8. *Steady State Noise* is a periodic or random variation in atmospheric pressure at audible frequencies which has a positive pressure envelope duration in excess of 1,000 milliseconds.

V. GENERAL REQUIREMENTS

1. Equipment operating, training, or maintenance tasks shall not require personnel to be exposed to noise that exceed the levels specified in Table 1 or 2 and Figure 1.

2. Noise reduction principles and techniques shall be applied to the equipment to achieve a minimum noise level at personnel occupied spaces.

3. The degree or extent of application of noise reduction principles and techniques to equipment shall be determined by the procuring activity.

4. Noise reduction shall *not* be accomplished by specifying ear protective devices as mandatory for use by system personnel unless:

   a. The cost of reducing the noise level to or below the noise levels stated herein is prohibitive.

   b. Systems effectiveness is degraded by reducing the noise level to or below the noise levels of this standard.

5. The provisions of paragraph 4 (Section V) shall be determined by the procuring activity.

VI. STEADY STATE NOISE REQUIREMENTS

1. An octave-band analysis of the steady state noise produced by the equipment shall be made. The analysis may be made using the commercial frequencies (ASA Z24.10-1953) and their respective noise levels (Table 1) or the preferred frequencies (ASA S1.6-1960) and their respective noise levels (Table 2).

TABLE 1

Maximum Steady State Noise Level for Army Materiel Command Equipment

(Commercial Frequencies [ASA Z24.10-1953])

Octave Band Limits (cps)	Center Frequency (cps)	Noise Level (dB)
37.5 - 75	53	120
75 - 150	106	115
150 - 300	212	109
300 - 600	425	101
600 - 1200	850	93
1200 - 2400	1700	89
2400 - 4800	3400	89
4800 - 9600	6800	91

TABLE 2

Maximum Steady State Noise Level for Army Materiel Command Equipment

(Preferred Frequencies [ASA S1.6-1960])

Octave Band Limits (cps)	Center Frequency (cps)	Noise Level (dB)
44 - 87	63	119
87 - 175	125	114
175 - 350	250	107
350 - 700	500	99
700 - 1400	1000	91
1400 - 2800	2000	89
2800 - 5600	4000	89
5600 -11200	8000	91

2. A steady state noise level reading at each octave band shall be determined for the following situations and combinations thereof; to be taken at the head position of:

a. Each operator position under all normal operating conditions.

b. Each instructor and trainee position where training is conducted.

c. Each maintenance personnel position where maintenance is conducted with the equipment operating.

d. Note: Personnel will not be used in these positions during the measurement program unless it is essential to the conduct of the test.

3. Where personnel other than an operator, instructor or maintenance man may be present in or on the equipment, readings shall be made at representative positions occupied by these personnel in accordance with the conditions expressed in paragraph 2 (Section VI).

4. The sound level meter and microphone used to measure the noise level, including calibration requirements for each, shall be in accordance with ASA S1.4-1961. The octave band analyzer used shall meet the requirements of ASA Z24.10-1953.

5. When pure tones, or narrow bands of noise, are present in any octave band, the sound pressure level of that octave band shall be reduced from the level shown in Tables 1 or 2, by 5 dB for frequencies above 1,000 cps and 10 dB for the frequencies below 1,000 cps.

6. Where the steady state noise level exceeds that specified in Tables 1 or 2, the distance from the source at which the noise level is equal to or below that specified in Tables 1 or 2 shall be determined.

7. At the discretion of the procuring activity, provision shall be made for operation of the equipment from the distance at which the noise level is equal to or below that specified in Tables 1 or 2.

8. When the noise level of the item of equipment exceeds that specified in Tables 1 or 2, the equipment shall be conspicuously marked as follows: "Warning, ear protection required within ___ feet when equipment is operating." The number of feet specified in the warning will be the result of measurements made in response to paragraph 6 (Section VI).

9. The warning marking specified in paragraph 8 (Section VI) shall be legible from the distance determined in paragraph 6 (Section VI).

10. Where the equipment steady state noise level exceeds the limits of Tables 1 or 2, training, operating, and maintenance manuals, both preliminary and final, will cite the warning and distance stated in paragraph 8 (Section VI).

VII. IMPULSE NOISE REQUIREMENTS

1. The impulse noise limits expressed in Figure 1 are the criteria of acceptability for small arms. Other weapons which fall within the limits of Figure 1 are acceptable. Weapons larger than small arms that do not meet the limits of Figure 1 must be reviewed for adequacy on an individual basis.

2. To be acceptable, positive peak sound pressure level vs. positive pressure duration shall be below limit "A" of Figure 1 and positive peak sound pressure level vs. positive pressure envelope duration shall be below limit "B".

3. Where positive peak sound pressure level measurements are made in pounds per square inch (PSI) Figure 2 shall be used for conversion to dB.

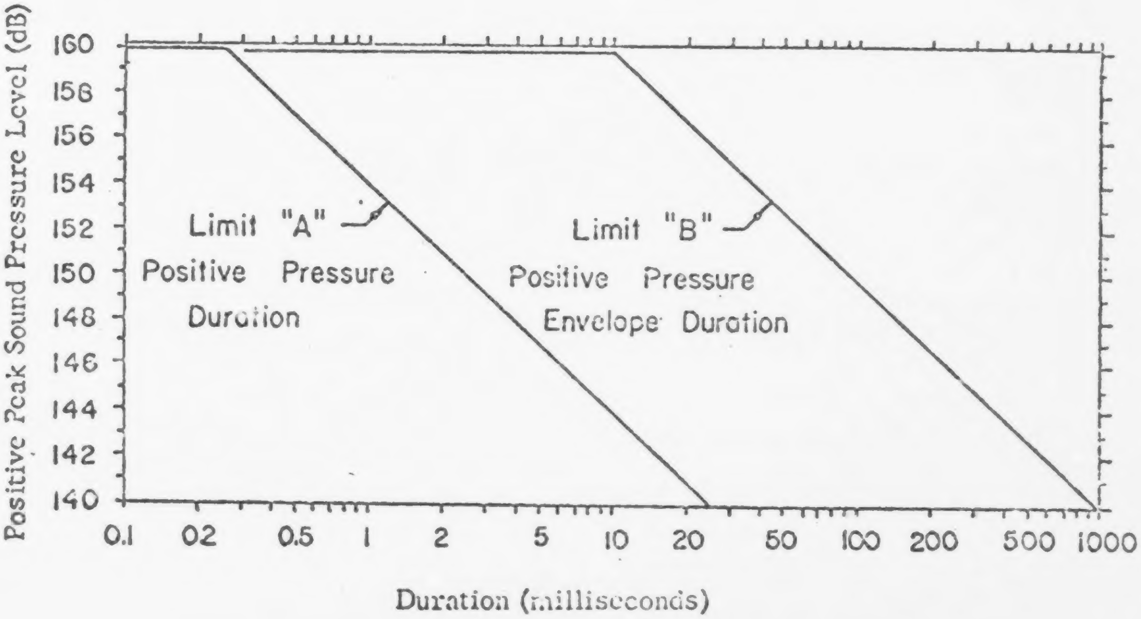

Fig. 1. Maximum Acceptable Impulse Noise Parameters for Army Materiel Command Small Arms

4. For measurement purposes, shoulder fired or hand-held weapons will be mounted with the barrel at least 40 inches above and parallel to the ground and with no large reflecting surfaces, including personnel, closer than 30 inches to the muzzle or the transducer. All other weapons will be measured in the physical position and in the system location from which they are normally fired.

5. Three pressure vs time histories shall be made of the impulse noise produced by the firing of three rounds, one round at a time.

6. The average of the three pressure vs time history measurements will be determined. The average of the three measurements will be sufficient if the positive peak sound pressure level does not vary more than ± 1 dB. Ten measurements will be averaged if this tolerance is exceeded.

7. Pressure vs time histories shall be obtained using an oscilloscope and a transducer possessing the following minimum requirements:

a. Amplitude distortion - less than 1.5 dB at the pressure being measured.

b. Ringing and overshoot - less than 1.5 dB at the pressure being measured.

c. Rise time - 10 microseconds or less at the pressure being measured.

8. Two of the three pressure vs time history measurements shall be made as follows: one at an oscilloscope sweep speed of 50 microseconds/cm and one at 1 millisecond/cm sweep speed.

9. The transducer shall be placed at the point, relative to the weapon, where the left ear of a right handed shooter or operator would be positioned.

10. Transducers shall be oriented at an angle to prevent a pressure increase due to reflection on the transducer face.

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Given 1psi = 6.895×10^4 dynes/cm² and

$$db = 20\log_{10}\left(\frac{p}{0.0002\ d/cm^2}\right).$$

then

$$db = 20\log_{10}\left(\frac{psi \cdot 6.895 \times 10^4}{2 \times 10^{-4}}\right) = 20\log_{10}\left(psi \cdot 3.4475 \times 10^8\right).$$

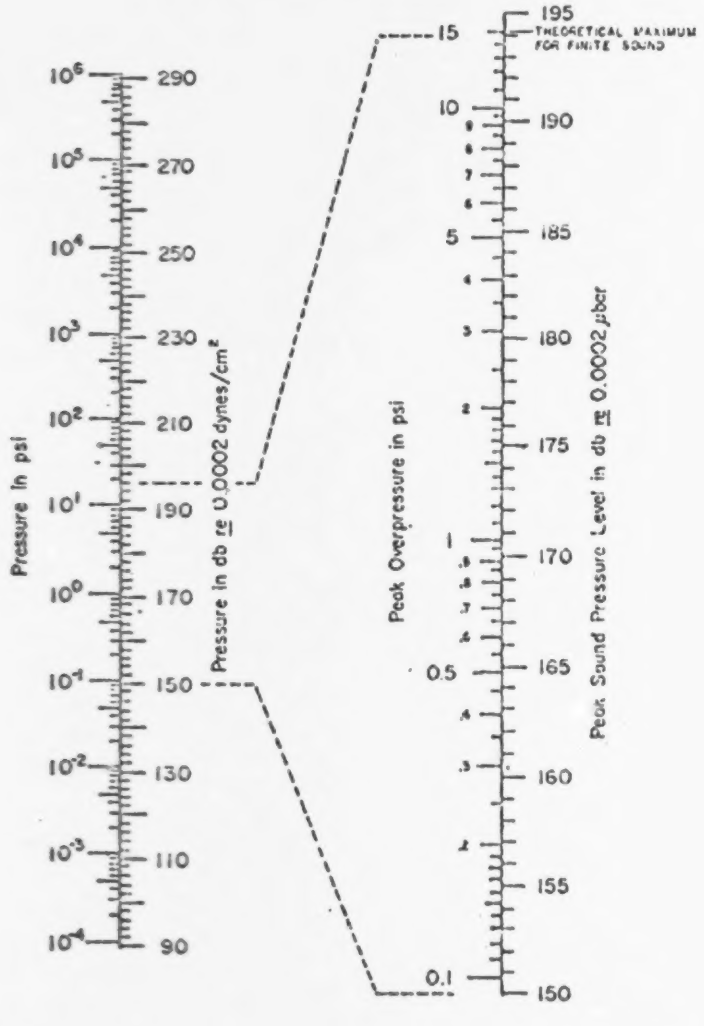

Fig. 2. Conversion of Pounds Per Square Inch to Decibels

VIII. COMMUNICATIONS

1. Where continuous person to person (non-electrically aided) communication of information is a system requirement, the steady state noise levels should not exceed those expressed in Tables 3 or 4.

2. Measurements shall be made in accordance with the requirements of Section VI paragraphs 1, 2a, 2d and 4.

TABLE 3

Maximum Steady State Noise Level for Non-Electrically Aided Person to Person Communication

(Commercial Frequencies ASA Z24.10-1953)

Octave Band Limits (cps)	Center Frequency (cps)	Noise Level (dB)
37.5 - 75	53	79
75 - 150	106	73
150 - 300	212	68
300 - 600	425	64
600 - 1200	850	62
1200 - 2400	1700	60
2400 - 4800	3400	58
4800 - 9600	6800	57

TABLE 4

Maximum Steady State Noise Level for Non-Electrically Aided Person to Person Communications

(Preferred Frequencies ASA S1.6-1960)

Octave Band Limits (cps)	Center Frequency (cps)	Noise Level (dB)
44 - 87	63	77
87 - 175	125	72
175 - 350	250	67
350 - 700	500	63
700 - 1400	1000	61
1400 - 2800	2000	59
2800 - 5600	4000	58
5600 - 11200	8000	57

IX. NOTE

1. Technical guidance concerning the provisions contained in this standard may be obtained from:

Acoustical Research Branch
Engineering Research Laboratory
U.S. Army Human Engineering Laboratories
Aberdeen Proving Ground, Maryland.

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TB MED 251*

DEPARTMENT OF THE ARMY TECHNICAL BULLETIN

NOISE AND CONSERVATION OF HEARING

Headquarters, Department of the Army, Washington, D.C.
25 January 1965

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1. Introduction. *a.* It has long been recognized that continuing exposure to loud noises may result in permanent impairment of hearing, which may affect combat efficiency and which is a recognized physical disability under many laws in this country. That this is a disability which can, in many instances, be prevented, has been likewise well established. Surgeons of military organizations and industrial physicians in the employ of the Army should, therefore, be familiar with the effect of noise on hearing and with measures which will prevent loss of hearing from such cause. It is the responsibility of these medical officers not only to be familiar with this subject but to identify noise hazards which may exist in the environment of personnel for whom they have health responsibilities, and to initiate hearing conservation programs when indicated.

b. This bulletin summarizes some important facts relating to noise and its effect on the ear, and outlines the essential features of a preventive program which has as its aim the conservation of hearing. Its purpose is to alert medical officers and other physicians in the Army to this problem, and provide guidance in those circumstances where a problem of potentially hazardous noise exposure exists, either among military or civilian personnel. Although the problem is important among both military and civilian personnel, it has been better recognized in industrial-type installations employing civilians. Hearing conservation programs have been in operation in some of these installations for years. Any orientation of this document toward such installations is not to be construed as emphasizing the importance of the program among civilian employees alone. Such orientation is merely a reflection of experience to date. The principles and methods apply equally well to military organizations.

2. Important Facts Relating to Noise and its Effect on the Ear. *a.* Noise may be defined as any undesired sound. Sound is vibrational energy capable of being heard and normally is transmitted to the ear through air. Under certain conditions, noise may injure the hearing mechanism. Two dimensions of sound have an important bearing on whether any given sound may be hazardous to hearing. These are frequency and intensity. Other factors include the nature of the sound (i.e., impulse or steady, intermittent or continuous); the length of exposure of the ear to the sound; and the relative sensitivity of the ear (*c* below).

b. Hearing loss caused by noise may be temporary or permanent. Permanent hearing loss from exposure to loud noise is generally the result of damage to the end organ of hearing, or organ of Corti,

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*This publication supersedes TB MED 251, 11 May 1956.

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ay known [illegible] at.

c. The ears of some individuals are more easily injured by noise than are the ears of others. Further, noise usually causes more impairment of hearing for high-pitched tones than for low-pitched tones; and, in the beginning, most of the impairment is above the pitch ranges important to the understanding of speech. Therefore, early damage is not noticed by the individual. Detection of losses in these ranges by the physician is important, for these losses may be regarded as danger signs of potential further hearing losses. Continued exposure will cause progression of damage including involvement of the speech frequencies which, if allowed to reach an advanced stage, will cause severe handicap. Deafness caused by noise can be prevented by reducing to a safe level the intensity of the sounds that actually reach the inner ear.

d. In many instances where injuriously loud noises are associated with an individual's occupation, the intensity of noise cannot be reduced to a safe level by any practical method of "sound treatment" of walls, machines, and the working environment.

e. Wearing cotton in the ears does not generally sufficiently reduce the amount of noise reaching the inner ear. Several kinds of ear protectors are available, which when properly fitted and worn, reduce many injuriously loud sounds to a level safe for the inner ear. The Army Medical Service procures and issues ear plugs which have been demonstrated by tests to be effective.

f. An individual's ability to hear separate tones from the lowest to the highest can be measured accurately with a pure-tone audiometer. The sound pressure level of noise is measured with a sound level meter, and its frequency composition is determined by means of an octave band analyzer.

3. Definitions. *a.* Loudness is that attribute of an auditory sensation in terms of which sound may be ordered on a scale extending from soft to loud. Loudness depends primarily upon the intensity of the sound stimulus.

b. The decibel (db) is a term borrowed from electrical communication engineering, and represents a relative quantity. When it is used to express noise levels, a reference level is implied. Usually, this reference level is a sound pressure of 0.0002 dyne per sq cm, and can be referred to as "0 decibels." This starting point of the scale of noise levels is about the level of the weakest sound that can be extremely quiet location.

pressure level in a large office usually is between 60 and 70 decibles.

c. Pitch is that attribute of an auditory sensation in terms of which sounds may be ordered on a scale extending from low to high. Pitch depends primarily upon the frequency of sound stimulus.

d. Tone is an acoustic stimulus whose pressure varies in a perfectly periodic manner. If there is only one component whose pressure varies in a simple sinusoidal manner, it is termed a "pure tone;" if it is analyzable into several such components, it is termed a "complex tone."

e. Noise in the most general sense is defined as any unwanted sound, be it pure tone, a complex of tones, or unwanted speech or music. The term noise is usually applied, however, to sounds that have a complex character acoustically; i.e., containing a large number of separate frequency components that extend over a wide range of frequencies and which are not normally generated to convey meaning or information.

f. Steady noise is noise that does not significantly change in level or spectrum.

g. A spectrum of sound is the pattern of the distribution of energy or sound pressure present at different points or areas along the scale of audible frequencies. It is common practice to measure the spectrum of a single complex sound or noise by means of filters that extend over an area along the frequency scale that is one octave in width; i.e., the band from 150 to 300 c.p.s., 300 to 600 c.p.s., 600 to 1,200 c.p.s., etc. The results of a spectrum analysis made with octave band filters is called the octave band spectrum of that noise.

h. Impulse or impact noise is characterized by a sharp rise in intensity followed by a rapid decline in intensity, such as that produced by gun fire. It can not be measured accurately with an ordinary sound level meter.

i. The audiogram is a record of the individual's hearing sensitivity in each ear for each of a number of pure tone test frequencies. The measure of hearing sensitivity is the individual's threshold of hearing, which is the lowest intensity of a given tone that he hears.

j. The audiometer is the instrument used to obtain an audiogram.

k. The hearing level of an ear at a specified frequency is the amount, in decibels, by which the threshold of audibility for that ear exceeds, or is less than, the standard audiometric threshold.

Essentials of a Hearing Conservation Program. The prevention of hearing loss from exposure to noise involves the coordinated application of engineering control measures, personal protective measures, and medical control measures, supplemented by health education, supervision, and discipline of personnel. Wherever feasible, such a program should be preceded by a noise survey. However, the institution of a hearing conservation program is indicated in the absence of a noise survey whenever persons have difficulty in communicating by speech while they are in the noise area, hear noises or ringing in their ears after working in the noise area for several hours, or have temporary loss of hearing that muffles speech and certain other sounds after several hours of exposure to the noise. In certain borderline cases, however, a noise survey is a prerequisite.

a. The Noise Survey.

(1) *Noise measurement.* An assessment should be made of the location and extent of noise-hazardous areas and personnel exposure. At all locations where noise makes it difficult for two persons with good hearing to converse at close range, tests should be made with a sound level meter, if feasible. The average overall level is determined by several meter readings made at each location. In general, where it is necessary to shout in order to be heard intelligibly at a distance of 1 foot, the noise level is at least and probably well over 90 db. Because steady noises from different sources, which vary in their composition and spectra, are related to the production of hearing loss, it is essential in conducting a survey that the noise be analyzed. This can be done by use of the octave band analyzer with the sound level meter. Noise levels should be measured at the approximate position of the worker's more exposed ear. Repeated measurements should be made to take account of variations in noise levels produced by changes in operating schedules or work procedures. Equally important in assessing noise exposure is the manner in which the noise is distributed in time throughout a typical workday. Whether the noise is continuous or intermittent, steady or impulse, should be determined during the survey since these characteristics have an important bearing on the question of hazard in a given noise situation. Some areas and operations common to many installations which usually are sources of hazardous noise are the interiors of tanks, personnel carriers, and truck cabs; field electrical generator sets; machine shops; carpenter shops; sheet-metal shops; engine repair and testing shops; weapons-firing ranges; any area where air-driven tools are used; aircraft in operation on the ground and in flight; and aircraft engines operated on stands. An inventory should be kept of all hazardous noise areas. A suggested format for recording the data gathered from the noise survey is available from the Commanding Officer, U.S. Army Environmental Hygiene Agency, Edgewood Arsenal, Md. 21040.

(2) *Noise exposure and hearing conservation.* The current knowledge of the relationship of noise exposure to hearing loss does not permit establishing definitive standards demarcating safe and hazardous noise exposure. It is possible, however, to point to certain noise levels that indicate when it is advisable to initiate hearing conservation programs. If the noise analysis reveals levels for the various octave bands in excess of those listed in table I the initiation of a hearing conservation program is indicated:

Table I

Octave band in cps	150–300	300–600	600–1200	1200–2400	2400–4800	4800–9600
Sound pressure level in db	92	85	85	85	85	85

These levels apply to exposure to relatively steady broad-band noises with relatively flat spectra (noises having about equal peak levels in 2 or more octave bands), and do not apply to impulse or narrow-band noises. For pure tones and narrow-band noises the presence of which is indicated by relatively higher (5 db or more) levels in a single octave compared to adjacent bands, the levels at which a hearing conservation program should be initiated are 5 db less than those in table I. In the absence of octave band analysis, hearing conservation measures must be instituted in all areas where the overall noise intensity is 90 db or greater, if damage to the ear is to be prevented.

(3) *Impulse noise.* It appears that repeated exposure to impulse noise exceeding 140 db could result in significant loss of hearing in some individuals. Data obtained on the firing of small arms indicate that exposures to noise levels in excess of 140 db result upon firing any of the common small arms. The wearing of adequate ear protective devices by all personnel so exposed is mandatory if damage to the ear is to be prevented. Exposure of personnel to impulse noise below 140 db may also be hazardous to some very sensitive ears, depending on the extent of such exposure and the intensity of the noise. When such exposures exist, a determination of the need for ear protection should be made by competent persons based on these factors.

b. Engineering Control Measures. The environmental control of noise exposure may involve the solution of complex noise reduction problems. Many such projects should be undertaken only with the help of acoustical engineers or consultants in noise control. The following methods of noise control are mentioned, however, since thay may feasibly be applied to certain situations: reducing the amount of noise produced by the source, reducing the amount of noise transmitted through air or building structures, and revising the operating procedures. Examples of noise source reduction include: substituting new equipment for that now in use, periodically performing repairs to and properly maintaining equipment, and making changes in processing methods. Examples of reducing noise transmission include: increasing the distance between work areas and noise sources, providing acoustical barriers between work areas and noise sources, reducing reverberation by sound-treating work area room surfaces, and installing vibration isolation mounts under equipment. Examples of operating procedure changes include: providing acoustical observation booths, providing sound-isolated remote control positions; changing job schedules, and rotating personnel.

c. Personal Protective Measures for Personnel not on an Electronic Communication Network.

(1) These consist of wearing ear plugs, ear muffs, or both. Whichever device will be worn consistently by the exposed individuals is an important determining factor in their selection. In exposures to extremely high steady-state noise levels (120 db and above), plugs and muffs must be worn together.

(2) Well-designed and properly fitted ear plugs or ear muffs will provide attenuation of noise reaching the inner ear of from 15 db in the lower frequencies to 35 db in the higher frequencies. Wearing ear plugs and ear muffs together, however, does not provide attenuation equal to the sum of that provided by wearing ear plugs or ear muffs separately. The combination of plugs and muffs provides from 35 db to 40 db noise attenuation at most frequencies. Regular use of ear protective devices is mandatory for all individuals exposed to noise in excess of the levels outlined in *a*(2) and (3) above. Little difficulty is experienced by persons with normal hearing in understanding speech when ear plugs or muffs are worn if the voice is raised slightly above the level of ordinary conversation. Actually it is easier for a person to hear and understand auditory signals, such as speech, in a sufficiently noisy environment with ear protection than without it. A simple demonstration may be useful in discussing this problem with other personnel. Put the tip of a finger firmly into each ear canal while conversing in a noisy environment. It will be noted that conversation can be understood more easily.

(3) Properly fitted ear plugs will not cause damage to the normal ear canal if ear plugs are kept reasonably clean. Plugs should be fitted individually for each ear under medical supervision. Occasionally the separate ear canal in the same individual will require plugs of a different size. A good seal between the ear plug and the ear canal is also very important so that no leak develops. Some initial discomfort may be noted with a good seal. If ear muffs are chosen in preference to ear plugs, the headband must be properly adjusted to insure a snug fit. When eyeglasses are worn with ear muffs it is important that the flange of the muff fits well around the temple of the glasses because even a small "leak" will completely

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[illegible] the [illegible] ear plugs, tend to work loose as a result of talking and chewing. Therefore, they must be reseated from time to time during the workday. The best ear protector is one that is worn. Personnel must be impressed with the importance of ear protection, because hearing damage becomes worse every day of exposure.

(4) Listed below are the ear plugs available through medical supply channels:

(*a*) Plug, Ear, Noise Protection, (size), 24s. (V-51-R).

1. FSN 6515-664-7858 Extra small
2. FSN 6515-299-8290 Small
3. FSN 6515-299-8289 Medium
4. FSN 6515-299-8288 Large
5. FSN 6515-664-7859 Extra Large

(*b*) FSN 6515-082-2675 Plug, Ear, Neois Protection, Regular, Triple Flange, 24s. (Plastic Sterilizable).

(*c*) FSN 6515-082-2676 Plug, Ear, Noise Protection, Small, Triple Flange, 24s. (Plastic Sterilizable).

(*d*) FSN 6515-721-9092 Plug, Ear, Noise Protection, Cotton, Impregnated, Disposable, 100s.

(*e*) FSN 6515-299-8287 Case, Ear plug, 12s. (This case holds one pair of any of the above mentioned ear plugs.)

(5) Listed below are the ear muffs available through regular supply channels:

(*a*) FSN 4240-861-3612 Aural Protector, Sound, High Performance, Noisefoe Mark II, Mine Safety Appliances Co.

(*b*) FSN 4240-991-1910 Aural Protector, Sound, High Performance, M258, Willson Co.

(*c*) FSN 4240-226-6016 Aural Protector, Sound, High Performance, M1200, American Optical Co

(*d*) FSN 4240-856-6050 Aural Protector Sound, High Performance, M19A, David Clark Co.

d. Medical Control Measures.

(1) *Preemployment or preassignment hearing evaluation.*

(*a*) Audiograms should be made a part of the preplacement physical examination. In military units, the duties associated with certain MOS numbers involving exposure to high noise levels and preassignment evaluations should be undertaken for all so designated. Audiometric tests should be made by adequately trained personnel. (A course of instruction in audiometric testing is given at the Army Audiology and Speech Center, Walter Reed Army Medical Center, Washington, D.C. 20012). This baseline or reference audiogram should be made at least 40 hours after the last exposure to high intensity noise. For the purposes of a hearing conservation program, only air conduction tests are required. An audiogram is made by presenting pure tones of variable levels of intensity until each tone is barely heard. This is the threshold for each tone. Only one ear is tested at a time, although both ears are covered by earphones which serve to reduce the effects of room noise. Recommended test frequencies are 250*, 500, 1000, 2000, 3000, 4000, 6000, and 8000* cycles per second. An audiogram may be considered within normal limits if there is no hearing loss in excess of 15 db at any one of the frequencies tested. Audiograms showing loss in excess of 15 db at any one or more of the test frequencies, but no greater than 20 db, are encountered frequently if testing conditions are not proper. These findings may or may not be significant, but such audiograms should be repeated. Losses in excess of 20 db indicate the need for referral to a physician for otological study of the individual. A suggested format (Hearing Conservation Data Card for recording the results of the audiometric examination and other pertinent hearing conservation data is available from the Commanding Officer, U.S. Army Environmental Hygiene Agency, Edgewood Arsenal, Md. 21040.

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*Tests at these frequencies are optional and generally will not be conducted unless a specific requirement exists. Additionally, few rooms are sufficiently insulated to conduct valid tests in the 250-cycle frequency.

The accuracy of the [illegible] be checked at least once a week, by tests made on several young persons who have no history of previous ear disease or hearing loss. Such a procedure not only checks the accuracy of the instrument, but also the effectiveness of sound isolation in the test room. The average threshold for these individuals should be within 10 db of the zero of the instrument at each test frequency. Failure to obtain such a result indicates either incorrect audiometer calibration or excessive room noise, or both. It is recommended that the audiometer be calibrated periodically (at least semiannually) by appropriate medical equipment repair facilities.

(2) *Criteria for assignment to hazardous noise duty.*

(*a*) Assignment to hazardous noise duty shall be made only if the loss of hearing in at least one ear (the better one)—

1. averages in the speech range (500, 1000, and 2000 cps), approximately 20 dbs, or less, or

2. is less than 50 dbs at the 4000 cps frequency.

(*b*) Even if the better ear is normal, assignment to such "noise exposure" duty shall not be made if the loss of hearing in the other ear (the poorer one)—

1. averages in the speech range (500, 1000, 2000 cps) 30 or more dbs, or

2. is 65 dbs or more at the 4000 cps frequency.

(*c*) Pathology of the inner ear resulting from noise exposure is considered as a type of acute or chronic ear disease and thus justifies assignment of the H3 profile, as specified in appendix VIII, AR 40-501.

(3) *Periodic hearing evaluation.*

(*a*) Routine periodic audiograms made on all personnel working in areas having high intensity noise are necessary to detect beginning changes in hearing acuity, since the individual may be unaware of any hearing change. The first periodic audiogram should be made at the beginning of the workday, approximately 60 days after the beginning of the worker's exposure to high noise levels. If any change [illegible] noted at this time, the worker should be removed from the high intensity noise area regardless of the protective measures which have been employed, since this may mean that the individual is highly susceptible to ear damage. If no significant change in hearing acuity is noted, subsequent audiograms should be made approximately every 12 months. Personnel exposed to excessively high noise levels (e.g., gun crews and weapons instructors) should be tested more frequently, These audiograms should be made at least 40 hours after the last exposure to hazardous noise. This time interval will allow for self correction of any temporary hearing threshold shifts.

(*b*) In all cases of suspected altered hearing acuity, not less than three audiograms should be made under similar conditions on different days, and at the same time of day, before considering the altered hearing acuity as valid.

(*c*) All personnel should be encouraged to report for evaluation if symptoms of progressive hearing loss or progressive tinnitus develop. This is imperative since timely action may prevent a permanent hearing loss.

(4) *Disposition of personnel with progressive hearing loss.*

(*a*) If on any of the followup audiograms, a notable progression of hearing loss is discovered (15 db in any one frequency, or 10 db in two or more frequencies, as compared with a preplacement audiogram or most recent annual audiogram), the person should be referred without delay to the local ENT facility so that an organic reason for the progression, such as middle ear infection, may be ruled out. If there is evidence that the loss is noise-induced, the person should be immediately relieved of all duties that may require further exposure to injurious noise levels. The audiogram should then be repeated after an additional 24 hours or more for verification, thus allowing a total of at least 60 hours for reversal of any short-duration temporary threshold shift.

[illegible] ured to [illegible] of the [illegible] on audiogram, the person should be relieved of his "noise exposure" duty for a minimum of 7 days, and should be retested at that time. If this 7-day test reveals hearing still acceptable for hazardous noise duty ((2) above), the essentials of hearing conservation should be reviewed with the person, and his personal protective devices should be refitted. He may then be returned to duty.

(*c*) If the test at the end of the 7-day period reveals hearing unacceptable for hazardous noise duty ((2) above), the person should be relieved of all duties that may involve further exposure to injurious noise for a minimum of 30 days. If at the end of this period the hearing has not improved to acceptable levels, the person should be permanently removed from any duty exposing his ears to injurious noise levels. If this 30-day test reveals hearing acceptable for hazardous noise duty, a review of the essentials of hearing conservation should be made with the person, and his personal protective devices should be refitted. He may then be returned to duty.

5. Diagnosis. Hearing loss caused by noise is difficult to differentiate from that resulting from such other factors as systemic disease, toxicity from infection, effect of drugs, and presbycusis. All reasonable methods of differential diagnosis should be used before establishing the diagnosis of hearing loss caused by noise. This includes a careful investigation of the worker's history with special reference to any previous hearing tests, a general physical examination, accurate pure tone bone and air conduction audiometric tests, and complete speech and discrimination tests. Trained personnel under the supervision of a physician or a qualified audiologist may measure hearing. The physician, however, is responsible for determining and evaluating the degree of hearing loss.

6. Health Education, Supervision, and Discipline. This is one of the most important features of a hearing conservation program, especially when reliance is to be placed on the use of personal protective devices. Personnel so exposed should be taught the nature of the hazard from noise, how to their protective equipment. This instruction should be integrated with a continuing program of on-the-job supervision. The supervisory and command personnel should be fully indoctrinated in the general aspects of the preventive program, and charged with appropriate responsibilities to assure its success, including disciplinary action if required.

7. The Testing Room. Hearing tests should be made in a room located in as quiet an environment as possible. The room should be readily accessible, preferably away from outside walls, elevators, heating and plumbing noises, waiting rooms, and noisy hallways. The noise levels within the testing room should not exceed those stated in the appendix. Where enough persons require audiometric testing to warrant the expense involved, the acquisition of a prebuilt audiometry booth, or the construction of a special testing room may be justified.

a. Prebuilt Audiometry Booths. Prebuilt audiometric testing booths usually are more satisfactory and may be less expensive than either specially constructed rooms or sound-treated rooms. The following standard audiometric testing booth is available through medical supply channels: FSN 6515-065-9600 Booth, Audiometric examination, Left-hand or Right-hand door, Prefabricated.

b. Special Rooms.

(1) Such rooms should measure at least 8 x 8 feet in plan and have some means of ventilation that does not reduce the efficiency of the sound isolation. This is a difficult problem and the following methods of ventilation are suggested: low velocity baffled air ducts, fans operated by door switches, or air-conditioning units with properly baffled ducts. If the ventilating equipment raises the sound level above acceptable limits, it should be turned off during hearing tests. The painting of acoustical tile can interfere with the sound-absorbing characteristics of the material and is therefore not recommended.

(2) The best results in sound treatment of the testing room are obtained through the services of an acoustical engineer. If these services are not available, the following practical methods of sound isolation are suggested: after a quiet room has been selected, false walls and ceiling of plasterboard, or similar material, should be erected within this space. The inside

floor measurements be not less than 6 x 6 feet in plan.

(3) When the room-within-a-room technique cannot be employed, the inside walls and ceilings of the selected room should be treated with a standard sound-absorbing material, and a soft floor surface installed. The door frames should be fitted with a positive closing [illegible] latch. If the room contains windows, these should be blocked.

8. Special Assistance. Request for special assistance in conducting noise surveys or establishing hearing conservation programs should be submitted to The Surgeon General, ATTN: MEDPS-PO, Department of the Army, Washington, D.C. 20315.

APPENDIX

SUGGESTED ALLOWABLE BACKGROUND NOISE LEVELS FOR HEARING CONSERVATION AUDIOMETRY ROOMS

The American Standards Association criteria for "Background Noise in Audiometer Rooms" are as follows:

Table II

Audiometric test frequency (cps)	125	250	500	1000	1500	2000	3000	5000
Octave bands (cps)	75 150	150 300	300 600	600 1200	1200 2400	2400 4800	2400 4800	4800 9600
Maximum acceptable level, each octave band, in decibels (dbs) (C scale, re 0.0002 dyne/cm²).	40	40	40	40	42	47	52	62

By Order of the Secretary of the Army:

HAROLD K. JOHNSON,
General, United States Army,
Chief of Staff.

Official:
J. C. LAMBERT,
Major General, United States Army,
The Adjutant General.

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AIR FORCE
NOISE PROGRAMS INFORMATION

The Air Force noise programs can be separated into three areas for specific consideration. These are: (1) the Conservation of Hearing Program; (2) research programs into the effects of noise, its characteristics and reduction; and (3) the development and acquisition of sound suppressors for ground runup of jet aircraft engines. Information in the format of the request follows for these three program areas.

Section 1
(Conservation of Hearing)

1. Organizational

a. Department of the Air Force

b. Authority

The Department of the Air Force does not, in general, carry out its programs in consonance with statutory authority, but rather by prescribing regulations. Section 8012, Title 10, U.S. Code, authorizes the Secretary of the Air Force to conduct all affairs of the Department of the Air Force "necessary or appropriate for the training, operations, administration, logistical support and maintenance, welfare, preparedness, and effectiveness of the Air Force, including research and development; and such other activities as may be prescribed by the President or the Secretary of Defense as authorized by law" and "to prescribe regulations to carry out his functions, powers, and duties under this title."

Thus, through Department of Air Force publications, Executive Orders, and implementation of DOD issuances, Air Force programs concerning activities relating to noise effects, abatement and control, are established.

2. Functional (Conservation of Hearing)

a. The overall program objective is to assure no impairment of performance, health, or safety among aerospace ground and flight crews, resulting from acoustical stresses and to provide adequate communications capability, despite acoustical and other environmental conditions peculiar to the missions.

b. Conservation of Hearing

(1) Description. The implementing Air Force Regulation (AFR 160-3, Hazardous Noise Exposure) assigns responsibility for the program and provides guidance for carrying it out, including specific noise exposure limits; special hearing tests for noise-exposed persons; a decision-management procedure based on these tests, to include criteria for final disposition of persons that develop adverse responses to their noise exposures.

(2) Objective. To control the ill effects of noise that can lessen hearing sensitivity and cause other effects harmful to health, efficiency, and well being.

(a) This program, which is designed to detect early hearing loss, is effective.

(b) Because of the Conservation of Hearing Program, personnel with hearing loss are detected early and either removed from noise exposure or protected prior to the occurrence of significant hearing loss. Evaluation of the efficiency of the program is accomplished by comparison with statistical data of other Federal agencies and by comparison of the number of persons removed from duty, involving noise exposure, with the total number of persons in the Air Force program. Comparison with Veterans Administration data reveals that of the total number of personnel receiving compensation for hearing loss, the Air Force comprises the smallest group. For the year for which the latest comparable HEW figures are available, in the 30 to 40-year group, noise-exposed USAF personnel had less noise-induced hearing loss than did a comparable non-occupationally noise-exposed population. Within the USAF, approximately 12,000 audiograms are accomplished each month, with some 150 military and/or civilian personnel being removed from noise exposure for administrative or medical disposition. The cost to the USAF of replacing a trained jet engine mechanic with 6 years experience is approximately $48,000. If, through the Conservation of Hearing Program, an incipient loss can be detected, the loss of a valuable employee, as well as significant money, can be averted. It is to this basic end that the program is directed.

c. Procedures

(1) Evaluation of the environment to determine if excessive sound pressure levels are present is considered to be one of the first steps in the control process for noise pollution. Without proper engineering evaluation of the source, appropriate control methods cannot be devised. Monitoring of the hearing acuity of Air Force personnel potentially exposed to hazardous noise often reveals an unexpected or previously undetected source of excessive noise. Such a disclosure obviously results in control procedures being instituted. The administrative and technician time to perform monitoring audiometry is therefore considered as being indirectly related to the control of noise. Air Force Bioenvironmental Engineers, Preventive Medicine Technicians, and the USAF Environmental Health Laboratories are involved in the evaluation of noise sources.

Research needs are many; however, a few of the salient proposed projects are as follows:

(a) Evaluate the use of A weighted sound levels as an indicator of biomedical significance of noise sources unique to the Air Force.

(b) Determine the correlation of auditory loss patterns with various types of acoustical insults. The identification and definition of patterns of hearing loss, as they relate to acoustic insults, with the intent of predicting characteristics of hearing loss from knowledge of the noise source or vice versa, will result from this study.

(c) Study of high frequency auditory acuity in personnel with mild noise-induced hearing loss. This program is designed to improve the status of differential diagnosis used to identify and substantiate sensory-neural hearing impairment that results from noise and to investigate the feasibility of initiating high frequency audiometry for screening individuals who are entering career fields involving exposure to hazardous noise.

(2) In addition to the actions, described elsewhere in this report, which are designed to control the noise at the source, the Air Force controls noise by reducing the level at the ear canal. Protective devices (ear plugs, muffs, helmets) are issued to personnel routinely exposed to noise.

(3) Noise is classified as an environmental pollutant by AFR 161-22, "Environmental Pollution Control." Standards and criteria are the responsibility of the USAF Surgeon General, who also interfaces with other standards-setting Federal and State agencies. In this regard, the responsibility for interfacing with other agencies rests with the Surgeon General.

(4) In-house capability is extensive. Primary management of the Conservation of Hearing Program rests with the Surgeon General and his national consultants. The USAF school of Aerospace Medicine conducts training and provides technical consultation, as well as being responsible for maintaining the Hearing Conservation Data Repository. All Bioenvironmental Engineers and Preventive Medicine Technicians receive formal training in noise-measuring equipment, theory of sound, and conduct and management of the hearing conservation program. The USAF Environmental Health Laboratories (Kelly and McClellan AFBs) and the USAFE Environmental Health Laboratory in Europe maintain specialized noise-measuring, recording and calibration equipment for use in particularly difficult problem areas. Some of the specialized equipment used in this program includes graphic level recorders, reciprocity calibrators, real time analyzers, sonagraphs, and anechoic and reverberation chambers.

(5) Basic guidance to the working level is being completely revised to include new standards which will not only reflect the latest scientific thinking in regard to industrial type noise, but will also promulgate standards for infra- and ultrasonics. Improved patient disposition guidance and reporting forms will be used.

d. The function and consultation responsibilities of the Hearing Conservation Data Repository will be expanded. The objective of this new and improved effort is to promote a more efficient hearing conservation program in the USAF and thus reduce losses of valuable, trained, and experienced personnel.

3. Fiscal

a. Current Program

(1) Facilities do not exist exclusively for conduct of the Conservation of Hearing Program. The total number of individual pieces of equipment used to monitor the environment

and conduct audiometry and the total investment in hearing protective devices cannot be determined with any degree of accuracy. Cost for various new pieces of equipment and devices has been determined to be for FY 72--$987,500.

(2) Current Operating Budget (FY 72)

(a) In addition to the cost of the items identified as equipment, direct operating costs are $509,300.

(b) Overhead, estimated at 50% of the operating budget, is $254,650.

(3) Personnel

(a) There are 191 Bioenvironmental Engineers; 664 Preventive Medicine Technicians; and 1 Audiologist.

(b) Salary total of $972,339 is based on the percent of time each specialty actually performs in the Conservation of Hearing Program.

(4) Contracts

No contracts are in force specifically for the Conservation of Hearing Program.

b. Past and Future Programs

(1) Past Programs

(a)

	Equipment	Operation
FY 68	959,687	533,777
FY 69	1,653,422	550,023
FY 70	1,201,359	575,300
FY 71	1,032,000	455,700
FY 72	987,500	509,300

(b) No facilities have been acquired for operation of the Conservation of Hearing Program in the past 3 to 5 years.

(2) Future Program Plans

(a) No facilities are programmed.

(b) Personnel levels are expected to remain relatively constant.

4. Regulation and certification of noise sources and control devices are not a function of this program.

Section 2
(Research Programs)

1. Organizational (see Section 1)

2. Functional (Research Programs)

a. Air Force noise research programs are conducted at the Air Force Aero-Propulsion Laboratory (AFAPL), the 6570th Aerospace Medical Research Laboratory (AMRL), and the Air Force Flight Dynamics Laboratory (AFFDL). The Air Force Office of Scientific Research also maintains programs of contracted research.

Air Force Office of Scientific Research: Strategic bombardment, tactical operations, and logistic support are Air Force functions which require the use of high performance flight vehicles. The operation of such vehicles produces intense noise from sources associated with propulsion systems and from noise and pseudonoise sources associated with flight through the atmosphere. This noise causes degradation in human performance, reduced reliability of structural and equipment subsystems, and increased maintenance. Because of a lack of a basic understanding of the physical behavior of high intensity sound, rational noise control and avoidance is difficult. The Air Force Office of Scientific Research maintains basic research programs aimed at achieving a better understanding of aircraft noise generation processes.

Air Force Flight Dynamics Laboratory: The Air Force Flight Dynamics Laboratory is conducting exploratory and advanced development work in aircraft acoustics, including noise control within vehicle interiors and sonic fatigue. The Laboratory has an extensive capability in theoretical acoustics, data management and analysis techniques, and experimental methods. Aircraft acoustics efforts include evaluation and prediction of sound field characteristics encountered by flight vehicles; design, development, operation, calibration, and maintenance of acoustic instrumentation and data analysis systems; and aural detectability studies related to quiet reconnaissance/surveillance aircraft. The Laboratory also maintains a number of in-house facilities for acoustic research.

Air Force 6570th Aerospace Medical Research Laboratory: The Aerospace Medical Research Laboratory conducts considerable research into all aspects of human response to noise with particular emphasis being placed on the study of Air Force generated noise and its effects on Air Force personnel.

Air Force Aero-Propulsion Laboratory: With the advent of larger and more powerful military aircraft propulsion systems, it becomes increasingly apparent that appropriate steps must be taken to alleviate the noise problem. Engine noise levels must be reduced in order to provide a safe working environment for ground and flight crews, to alleviate the problem of acoustically induced structural fatigue, to reduce the possibility of aural detection during combat operations, and to improve the general community environment around military air bases. In order to achieve the apparently diverging goals of low noise and high performance, continuing research efforts to develop a better understanding of the basic mechanisms of noise generation are required. The Aero-Propulsion Laboratory maintains a comprehensive propulsion acoustics research and development program consisting of contracted and in-house efforts. The overall objective is to develop the technology base necessary to significantly reduce aircraft propulsion system noise with minimum associated performance and weight penalties.

b. Specific Programs and Research

(1) Description. (See Appendix A)

(2) Objective. (See Appendix A)

c. Procedures

(1) Noise research needs and problem areas are identified through system development and operation and are handled within the existing organizational structure, namely, the Air Force Systems Command and its associated laboratories.

(2) Specific actions to abate and control noise can be determined from the required research, and in turn, may be the foundation for a specific regulation. A good example of this is Air Force Regulation 55-34, "Reducing Flight Disturbances that Cause Adverse Public Reactions," which regulates Air Force supersonic flight activities to reduce the effects of sonic booms.

(3) The research and development described above is coordinated with the programs of other government agencies through the National Academy of Sciences, the Federal Aircraft Noise Abatement Program, and the Environmental Protection Agency.

(4) The in-house capability for noise research is extensive and therefore no important problems, likely to arise, relating to Air Force operations and concern are outside the capabilities of the existing Air Force research structure.

d. Future Program Proposals and Objectives

There are no future program proposals other than the continuation of present programs; the objectives remain essentially the same.

3. Fiscal (Research Programs)

a. Current Program

(1) There are no major Air Force laboratories devoting their full resources to noise research. Noise research programs utilize something less than 3% of the resources of the laboratories having noise research programs. The real property values of these laboratories and equipment are:

	AFFDL	AMRL	AFAPL
Real Prop (Million $)	22.900	11.387	13.091
Equip (Million $)	18.427	21.806	13.612

(2) Current Operating Budget (FY 72)

(a) Direct operating costs (see Appendix A, page 24).

(b) Overhead is estimated at 50% of the operating budget.

(3) Personnel

(a) Current authorization

	AFFDL	AMRL	AFAPL
Military Ph.D.	10	27	3
Civilian Ph.D.	2	26	5
Military Prof.	82	80	52
Civilian Prof.	338	96	170
Military Non-Prof.	6	46	6
Civilian Non-Prof.	288	70	161
Total	714	292	389

(b) Since it is nearly impossible to estimate the number of man hours spent on noise research alone, a salary total of between $300,000 and $400,000 is given.

(4) Contracts

(a) About 40% of all noise research is performed by firms and institutions on contract to the Air Force.

(b) Funding by project is itemized in Appendix A.

(c) The total for the projects itemized in the appendix is $1,255,000 (FY 72).

b. Past and Future Programs (Research Programs)

(1) Past Programs

(a)

	Funding
FY 68	800,000
FY 69	904,000
FY 70	992,000
FY 71	1,337,000
FY 72	1,255,000

(b) Facilities Acquisition

Dynamic Pressure Chamber (AMRL) $432,168

(2) Future Program Plans

(a) No facilities are programmed.

(b) Personnel levels are expected to remain relatively constant.

4. Regulation and certification of noise sources and control devices are not a function of this program.

Section 3
(Sound Suppressors)

1. Organizational (see Section 1)

2. Functional (Sound Suppressors)

a. The Air Force program for the development and acquisition of sound suppressors has the following objectives:

(1) Protect maintenance personnel performing test and trim operations from sound intensities of over 135 decibels.

(2) Eliminate the hearing damage risk for personnel without ear protection working up to eight hours a day at 250 feet or more from the power check pad or jet engine test stand.

(3) Provide a communication environment inside a frame building, with windows and doors partly open, equivalent to that normally experienced in shop areas with moderately noisy machinery or in hangars used for routine aircraft maintenance when operated at 500 feet from such a building.

(4) Provide sufficient suppression so that essentially no complaints would be expected from a residential community 2500 feet from the power check pad or jet engine test stand while making up to five single engine runs per day of more than five minutes duration between the hours of 0700 and 2200.

(5) Allow continuous around the clock operations one mile from a residential community.

b. The following programs have been initiated to provide demountable and portable noise suppression equipment for use during ground maintenance runup operations of turbine-powered aircraft and engines on test stands.

(1) Thirteen demountable AF32A-13 noise suppressor systems for use with F-111 aircraft are being procured from Industrial Acoustics Company, Inc., under Contract No. F33657-69-C-1302. The total amount of this contract, which was awarded in June 1969, is $2,630,244. The first article installation at McClellan AFB, California, was tested with F-111A and FB-111 aircraft in July-August 1970, and the contractor is proceeding with the fabrication and delivery of the remaining production units.

(2) Koppers Company is proceeding with the manufacture of twenty-two demountable AF32A-14 noise suppressor systems for use with F-4 aircraft. These units are being procured under Contract No. F33657-69-C-1195 which was awarded in June 1969 at a price of $3,121,166. The first article installation was successfully tested at MacDill AFB, Florida, in August 1970.

(3) Contract No. F33657-70-C-1154 was awarded to Koppers Company in June 1970 for the delivery of two AF32T-2 and ten AF32T-3 demountable engine test stand noise suppressor systems at a price of $2,137,470. The T-2 system is for operation with TF30, TF41, J75, J57, and J79 engines, and the smaller T-3 system is for operation with only J57 and J79 engines.

(4) A sole-source contract for $87,325, was awarded to Koppers Company in September 1970 to satisfy an urgent requirement for a demountable AF32A-19 noise suppressor system for use with A-7 aircraft. An IFB has gone out to four firms, having acceptable technical proposals, for the procurement of eleven additional A-19 systems.

(5) Technical proposals have been evaluated and the IFB is about to be released to two firms for the procurement of fifteen demountable AF32A-18 noise suppressor systems for use with T-38 aircraft.

(6) A Request for Technical Proposals was sent out to industry in September 1970 for the procurement of demountable noise suppression equipment to be used at Air National Guard bases. These include three AF32A-16 noise suppressor systems

for use with F-100 aircraft and J57 engines on a portable test stand and four AF32A-15 noise suppressor systems for use with F-101 aircraft and J57 engines on a portable test stand.

(7) Acceptance testing of the demountable AF32A-17 noise suppressor system installed at McGuire AFB, New Jersey, took place in March 1971. This system was manufactured by Industrial Acoustics Company under Contract No. F33657-69-C-0890 and is designed for operation with F-105 aircraft and J75 engines on a portable test stand.

(8) Final testing of the portable A/M32A-77 exhaust muffler and A/M32A-80 intake muffler with a C-141 aircraft is scheduled for McGuire AFB in April 1971, and final testing of the portable A/M32A-78 exhaust muffler and A-80 intake muffler with a C-135B aircraft is scheduled for Tinker AFB in May 1971. These prototype R&D units were designed and manufactured by Industrial Acoustics Company under Contract No. F33657-68-C-0047.

(9) Future efforts during the coming fiscal year include the provision of additional demountable noise suppression equipment for use with the F-105 aircraft and new demountable equipment for use with the F-15 aircraft.

c. Procedures (This question is addressed in the previous sections.)

d. This continuing program evaluates new methods for sound suppression leading to further development and ultimately to the acquisition of new sound suppressors.

3. Fiscal

a. Current Program

(1) Real property value of sound suppressors and site preparation listed by fiscal year since 1967.

FY 67	$ 167,000
FY 68	$ 630,000
FY 69	$ 3,026,500
FY 70	$ 6,295,000
FY 71	$ 9,924,000
FY 72	$ 7,060,000
Total	$27,102,500

(2) Current Operating Budget (FY 72)

(a) Direct operating cost (see funding by project).

(b) Overhead and maintenance funding is $67,138.

(3) Personnel

Salary total for the sound suppressor program is $135,492.

(4) Contracts

(a) Acquisition of sound suppressors is entirely by contract.

(b) Funding by project. Sound suppressor acquisition by contract (FY 72), $4,810,000.

b. Past and Future Programs

(1) Past Programs - (FY 67-72) $27,102,500.

(2) Future Program Plans

(a) Projected facilities costs

FY 73 $6,290,000

(b) Personnel levels are expected to remain relatively constant.

4. Regulation and certification of noise sources and control devices are not a function of this program.

1 Attachment
Appendix A

Research Program Project
Descriptions

SUMMARY

1. Air Force Office of Scientific Research

Program Element: 61102F

Project/Task/Work Unit	Description
9781/02	Dynamics of Flow Fields
9781/02/001	Aerodynamically Generated Sound
9781/02/002	High Intensity Sound
9781/02/003	Noise Generation by a Transonic Compressor Row

2. Air Force Flight Dynamics Laboratory

Program Element: 62201F

Project/Task/Work Unit	Description
1471/02	Prediction and Control of Aircraft Noise
1471/02/003	Helicopter Acoustic and Vibration Surveys
1471/02/009	Noise from Deflected Jet VTOL Aircraft
1471/02/010	Noise Prediction from VTOL Aircraft
1471/02/011	Noise from Linear Array of Large Turbojet Engines
1471/02/012	Aircraft Design for Minimum Noise
1471/02/013	Radiated Noise from Sailplanes
1471/02/014	Low Speed Aerodynamic Noise Generation
1471/02/015	Aural Detectability of Light Reconnaissance A/C
1471/02/019	Acoustic Tests of Noise Suppression Panels

3. Air Force 6570th Aerospace Medical Research Laboratory

Program Element: 62202F

Project/Task/Work Unit	Description
7231	Biomechanics of Air Force Operations
7231/03	Effects of Operational Noise on AF Personnel
7231/03/015	Control of Human Exposure to Acoustic Energy
7231/03/016	Auditory Responses to Acoustic Energy
7231/03/017	Whole Body Effects of Air Force Noise on People
7231/03/018	Effects of Acoustic Stimulation of the Vestibular System
7231/03/019	Voice Communication During AF In-Flight and Ground Operations
7231/03/020	Simultaneous Exposure to Acoustic Energy and Other Stressors
7231/03/021	Human Orientation During Intense Noise Exposure

Project/Task/Work Unit	Description
7231/03/022	Effects on the Vestibular System of Acoustic Energy
7231/03/023	Effects of Air Force Noises
7231/03/024	Cell Changes Associated with Temporary Hearing Loss
7231/04	Measurement of Noise and Vibration Environments
7231/04/011	Dynamic Pressure Chamber
7231/04/017	Mechanisms of Noise Generation, Propagation, and Reception
7231/04/018	Bioacoustic Environments of USAF Aerospace Systems
7231/04/020	Vibration Environments
7231/04/023	Data Acquisition System for Noise Measurement

4. Air Force Aero Propulsion Laboratory

Program Element: 62203F

Project/Task/Work Unit	Description
3066/12	Propeller Technology
3066/12/001	Study of Propeller Vortex Noise
3066/12/002	Propeller Acoustics Test Facility
3066/12/005	Performance and Acoustic Testing of a Variable Camber Propeller
3066/12/006	Quiet Propeller Design Procedure
3066/12/007	Propeller Acoustics Research
3066/12/008	Quiet Propeller Concept Evaluation
3066/14	Propulsion Acoustics
3066/14/001	Small Turbine Engine Noise Reduction
3066/14/002	Supersonic Jet Exhaust Noise - Program 1
3066/14/003	Supersonic Jet Exhaust Noise - Program 2
3066/14/004	Supersonic Jet Exhaust Noise - Program 3
3066/14/005	Jet Noise Reduction for Military R/S Aircraft

5. Air Force Weapons Laboratory

Program Element: 63723F

Project/Task/Work Unit	Description
683M	Computer Noise Exposure Forecasting

1. Air Force Office of Scientific Research

Program Element: 61102F

Project: 9781
Task: 02
Title: Dynamics of Flow Fields

Strategic bombardment, tactical operations, and logistic support are AF functions which require the use of high performance flight vehicles. The operation of such vehicles produces intense noise from sources associated with propulsion systems and from noise and pseudonoise sources associated with flight through the atmosphere. This noise causes degradation in human performance, reduced reliability of structural and equipment subsystems, and increased maintenance. Because of a lack of a basic understanding of the physical behavior of high intensity sound, rational noise control and avoidance is difficult. The Air Force Office of Scientific Research maintains basic research programs aimed at achieving a better understanding of aircraft noise generation processes.

Project: 9781
Task: 02
Work Unit: 001
Organization Performing R&D: University of Toronto, Toronto, Canada
Title: Aerodynamically Generated Sound

This research is directed toward developing a comprehensive physical model of jet noise which covers generation, convection, refraction, and spectrum properties. Research is being conducted in the areas of aerodynamically generated sound and subsonic aerodynamics. In the area of sound the following projects are being conducted:

a. correlation of sound with hot wire measurements in a jet. A direct correlation between the turbulence (the cause) and the sound (the effect) is being attempted.

b. shielding flap scheme of jet noise suppression. The effectiveness of a wing as a shield for jet noise is being examined experimentally.

c. wind noise in vehicles. An experiment is being conducted to determine the relation between the jet flow over a cavity and the noise generated by the flow,

d. model of Mach wave noise emanating from the lip of a supersonic jet. A mathematical analysis is being made to delineate the mechanisms of noise generation of a rocket nozzle, and

e. extended near-field concept for sonic boom alleviation. The possibility of delaying the transition of the near field signature to the far field pressure signature is being examined. In the area of subsonic aerodynamics the lift distribution and moment of a wing cutting obliquely through a simulated trailing-vortex of another airplane is being determined.

Project: 9781
Task: 02
Work Unit: 002
Organization Performing R&D: University of Texas, Austin, Texas
Title: High Intensity Sound

This research is concerned with investigating the behavior of high-intensity sound and applying the understanding gained to problems of interest to technology such as sonic boom, propagation of intense noise from jet engine compressors, underwater propagation, etc. This is a theoretical and experimental effort on high-intensity sound and its interaction with a real media. The purpose of the work is to study the phenomena that distinguish nonlinear acoustics from linear acoustics and to apply the knowledge gained to physical problems. Specific topics being studied are:

a. stability of the acoustic boundary layer. The object is to predict the threshold at which a transition from laminar to turbulent flow takes place. The frequency dependence of this threshold is of particular interest.

b. standing waves of finite amplitude. Chester's theoretical predictions are being checked by experiments.

c. quasi-plane-wave mode for finite-amplitude waves in a tube. Experimental tests are being conducted to check past theoretical solutions.

d. finite-amplitude waves in relaxing media.

e. electrical transmission-line analogs of acoustical propagation problems, such as progressive waves in relaxing media, randomly in homogeneous, turbulent media, or nonlinear media.

Project: 9781
Task: 02
Work Unit: 003
Organization Performing R&D: Cornell Aeronuatical Laboratory Inc.
Buffalo, New York

Title: Noise Generation by a Transonic Compressor Row

The Air Force is presently and will continue to be in the foreseeable future a large user of high subsonic jet aircraft. The principal means of propulsion of such aircraft is the high bypass-ratio turbofan engine. An undesirable byproduct of these engines is the generation of noise which causes such adverse effects as degradation in human performance, reduced reliability of structural and equipment subsystems, and increased maintenance cost. The design of vehicle parts and soundproofing which alleviate these effects requires accurate definition of the intensity and occurrence of the noise. In order to partially fulfill this requirement a theoretical study of the problem of fan-noise generation in a high bypass-ratio turbofan engine is being made. The main emphasis in this study is the noise aspects of the three-dimensional, transonic flow through a single blade row. A linear acoustic theory for the case of non-lifting blades is being applied to the problem of noise generation. An effort is being made to extend the theory to lifting blades and to examine the effect of more realistic duct geometries.

2. Air Force Flight Dynamics Laboratory

Program Element: 62201F

Project: 1471
Task: 02
Title: Prediction and Control of Aircraft Noise

The Air Force Flight Dynamics Laboratory is conducting exploratory and advanced development work in aircraft acoustics, including noise control within vehicle interiors and sonic fatigue. The Laboratory has an extensive capability in theoretical acoustics, data management and analysis techniques, and experimental methods. Aircraft acoustics efforts include evaluation and prediction of sound field characteristics encountered by flight vehicles; design, development, operation, calibration, and maintenance of acoustic instrumentation and data analysis systems; and aural detectability studies related to quiet reconnaissance/surveillance aircraft. The Laboratory also maintains a number of in-house facilities for acoustic research.

Large Sonic Fatigue Facility

The test chamber of this facility has average physical dimensions of 42 x 56 x 70 feet and can be operated in either reverberant mode or progressive wave mode. Full scale specimens can be tested in sound fields up to 162 decibels (re. .0002 dynes/cm^2). Smaller specimens or reduced surface areas can be exposed to sound pressure levels up to 174 decibels. The facility includes a complete data acquisition and analysis capability.

Wide Band Noise Facility

This facility is powered by a 12 kilowatt wide band siren, capable of producing a continuous spectrum over a frequency range of 50 Hz to 12,000 Hz, approximating the noise field of a jet or rocket engine. A maximum overall sound pressure level of 160 decibels can be attained at the siren horn mouth.

Mobile Dynamics Data Acquisition and Analysis Facility

This mobile facility permits accurate and detailed measurements of complex environmental noise fields. The facility is particularly useful for field data acquisition on flight lines, test stands, and in remote areas such as rocket motor test sites. The mobile facility can simultaneously acquire five continuous channels of FM-FM telemetry data and thirty-nine continuous channels of wide band FM data via landlines. Thirty-six 1500 feet long landlines are contained on power-driven cable reels.

Project: 1471
Task: 02
Work Unit: 003
Organization Performing R&D: AFFDL/Army
Title: Helicopter Acoustic and Vibration Surveys

The objective of this effort is to determine flight and gunfire induced environments of helicopters for (a) developing and verifying vibration and acoustic prediction methods applicable to rotor powered aircraft, (b) establishing realistic test methodologies for avionics and electronic equipment for VTOL aircraft, (c) developing methods of structural vibration damping, and (d) obtaining human environmental data. Measurements have been taken with microphones installed on top of the fuselage to measure the downwash acoustic environment directly under the rotor, on the pilot's and co-pilot's helmets, and in passenger and equipment compartments. Data were obtained on sound pressure levels and frequency spectra at these microphone locations during various flight conditions, gunfire, rocket and grenade launch. Analog data were recorded on tape to permit acoustic and vibration transmission and correlation studies.

Project: 1471
Task: 02
Work Unit: 009
Organization Performing R&D: AFFDL (In-house)
Title: Noise from Deflected Jet VTOL Aircraft

The noise environment in the field on a P-1127 aircraft has been measured with the aircraft fixed on a vertical thrust stand. The data have been analyzed and used to develop a method to predict the acoustic environment as a function of engine parameters. These results are being prepared for publication.

Project: 1471
Task: 02
Work Unit: 010
Organization Performing R&D: Wyle Laboratories, El Segundo, California
Title: Noise Prediction from VTOL Aircraft

The objective of this effort is to develop methods to predict the near-field noise environment associated with VTOL aircraft. The contractor has developed a method of predicting the near-field noise of propellers. A preliminary analysis of undeflected jets has been completed. The analysis correlates normalized near-field octave band levels in terms of a Strouhal frequency with a normalized distance parameter based on jet diameter and axial position relative to the length of the potential core. Future emphasis will be placed on near-field prediction methods for rotors, fans and compressors. The effects of solid boundaries will be accounted for in the prediction methods.

Project: 1471
Task: 02
Work Unit: 011
Organization Performing R&D: AFFDL (In-house)
Title: Noise from Linear Array of Large Turbojet Engines

The purpose of this program is to determine the interaction effects of multiple turbojet exhaust noise sources in determining the near-field acoustic environment. Data were obtained in the form of sound pressure levels and frequency spectra at various microphone locations. Analog data were recorded on tape for later analysis.

Project: 1471
Task: 02
Work Unit: 012
Organization Performing R&D: Bolt, Beranek, and Newman Inc., Cambridge, Massachusetts
Title: Aircraft Design for Minimum Noise

The objective of this effort is to conduct a comprehensive investigation of aircraft and propulsion design relative to minimum noise generation and to establish the methodology and design information required to design an aircraft from the standpoint of minimum aural detection.

Project: 1471
Task: 02
Work Unit: 013
Organization Performing R&D: AFFDL (In-house)
Title: Radiated Noise from Sailplanes

The objective of this effort is to identify the noise associated with a powerless aircraft and to relate this noise to area and velocity parameters of the aircraft. The flyby noise from three sailplanes, Schweizer 2-32, Schweizer 2-33, and Libelle, has been recorded on tape and one-third octave and overall bandwidth analyses obtained. The noise levels from each of the sailplanes follows a sixth power of the velocity and appear to be directly proportional to the turbulent area on the wing. A test report has been prepared which presents the results obtained to date.

Project: 1471
Task: 02
Work Unit: 014
Organization Performing R&D: University of Tennessee Space Institute
Tullahoma, Tennessee
Title: Low Speed Aerodynamic Noise Generation

The objective of the effort is to conduct an investigation of the noise associated with flight and to determine methods of suppressing the noise radiated from these sources. Presently available analytical expressions describing the noise produced by the aircraft in flight will be evaluated. Modes of quiet flight found in nature will be studied and their mechanisms analyzed. Those techniques which appear most promising will be further investigated by suitable experimental means from the results of the above studies. Recommended techniques will be developed for application to the design of aircraft from the viewpoint of aural detection.

Project: 1471
Task: 02
Work Unit: 015
Organization Performing R&D: Bolt, Beranek, and Newman Inc.
Cambridge, Massachusetts
Title: Aural Detectability of Light Reconnaissance A/C

The objective of this effort is to develop aural detection criteria for evaluating the detectability of light reconnaissance/surveillance type aircraft. Factors affecting the aural detection of light aircraft will be defined and series of psychoacoustic experiments on the detectability of synthesized aircraft noise signatures in the presence of various background noise environments will be conducted and from the results of these experiments aural detection criteria will be developed. These criteria will then be applied to recorded data from light aircraft fly-over in a second series of psychoacoustic experiments and will confirm or suggest refinements to the aural detection criteria.

Project: 1471
Task: 02
Work Unit: 019
Organization Performing R&D: Aeronca Inc., Middletown, Ohio
Title: Acoustic Tests of Noise Suppression Panels

This effort was initiated to compare the acoustic performance of various brazed broadband resonators and thereby provide design guidelines for full-scale engine hardware. The resonators are to be used as absorptive linings in engine ducts to attenuate the fan and compressor noise. The acoustic performance, noise reduction and insertion loss, were measured in a duct facility for frequencies from 500 to about 8000 Hz and for SPL's up to 160 dB. The broadband resonators consisted of honeycomb panels fabricated from various combinations of core height, cell size, and facing material. The facing material consisted of perforated sheet and fiber metal construction.

3. Air Force 6570th Aerospace Medical Research Laboratory

Program Element: 62202F

Project: 7231
Task: 03
Title: Effects of Operational Noise on Air Force Personnel

Noises experienced by Air Force personnel are the most severe in existence, creating potential problems for hearing, voice communication, performance and other body functions which threaten mission accomplishment. Noises from sources such as large rocket boosters, aircraft engines and ground support equipment continue to increase in number and intensity. The primary objective is to control acoustic exposures of Air Force personnel and neighbors within safe and acceptable limits through research directed to definition of hazardous noise, determination of effects on body function and on performance, establish principles and devices to counteract adverse effects and specify exposure limits in the form of tolerance criteria to control overexposure. Major emphasis is on in-house research with minimal supplemental efforts by contract. Coordination occurs with the Army, Navy, NASA, FAA and DOT.

Project: 7231
Task: 03
Work Unit: 015
Organization Performing R&D: AMRL (In-House)
Title: Control of Human Exposure to Acoustic Energy

The objective of this program is to investigate all avenues of potential value for controlling personnel exposures in the wide variety of usual and unusual acoustic environs of Air Force operations, and to control, within acceptable limits, the intrusion of noise into residential areas neighboring on Air Force activities. The continuous growth of Air Force noise problems, currently reflected in higher levels of intensity and more frequent exposures, significantly increases exposures of persons on or near Air Force activities to possible adverse effects of the acoustic energy. This effort is to provide the principles, devices and procedures necessary to control, within safe and acceptable limits, human exposures to the many types of noise encountered in Air Force activities. Personal sound protective devices including earmuffs, helmets, pressure and noise suits are evaluated and developed. Criteria and exposure guidelines for defining risk associated with various noise exposures will be established. Procedures for estimating reactions of individuals and communities to noise exposure will be developed. The comparative individual annoyance of particular sounds that appear to be either approaching or moving away from the observer has been evaluated in three successive phases of an overall study of acceptability. Investigations have been completed on effectiveness of new personal sound protectors; the effect of wearing eyeglasses on earmuff attenuation, attenuation effectiveness of flight helmets for VSTOL aircraft and the acoustic features of the special purpose Paramedic Helmet. Attenuation provided by a whole body sound protection suit is being investigated. Work on a negative-pressure earplug has jet been initiated.

Project: 7231
Task: 03
Work Unit: 016
Organization Performing R&D: AMRL (In-house)
Title: Auditory Responses to Acoustic Energy

The objectives of this program are to examine various characteristics of human hearing such as resistance to noise, temporary hearing loss, recovery from hearing loss, relative effects of frequency, intensity, duration and intermittency of hearing loss, high frequency hearing (above 8000 Hz), and long term low level effects in order to establish general principles of behavior of the human ear in noise and to determine the potential hazard of specific Air Force problem noise environs and provide means for minimizing or eliminating these effects. One of the most prevalent and serious effects of noise in Air Force operations is overexposure of the human auditory system, resulting in impairment of hearing. Effective preventive and control measures must be based upon the definition and understanding of the functioning of the human auditory system in the presence of noise. This work is related to the infrasound program and assessment of damage risk criteria for infrasound. Bone conduction hearing, noise induced hearing loss, drum membrance retraction, and electrostatic hearing are specific auditory effects studied. Effects of acoustic signals below 20 Hz at sound pressure levels of 120-140 db on auditory acruity and tympanic membrane retraction are measured. A study of the response of the auditory system to internal infrasound was recently initiated.

Project: 7231
Task: 03
Work Unit: 017
Organization Performing R&D: AMRL (In-house)
Title: Whole-Body Effects of Air Force Noise on People

A wide range of intense Air Force noise environments not only effect hearing but may interfere with motor performance, physiological functioning, thought processes and contribute to fatigue in personnel. This effort investigates types of noises and exposure conditions in which accomplishment of the Air Force mission may be threatened because of these adverse whole-body effects. Results are used to formulate exposure limitations and establish specifications for use by Air Force activities responsible for assuring that personal noise exposures are non-hazardous. The approach is to measure effects of the many kinds of noises (infrasound, audio frequencies, impulses) on a battery of standard performance tasks; on circulation in the peripheral members (fingers) and other physiological processes and on mental tasks such as memory. Findings are used to establish exposure limits beyond which undesirable effects may occur. Much of this work is possible only because of the unique laboratory sound generators available at AMRL. Infrared thermography is being used as an indirect indicator of peripheral circulation changes induced by whole body noise exposure. Pre-test arrangements have been completed and data collection from human subjects will begin in the immediate future. Ongoing efforts continue to measure performance on a wide variety of tasks and on short term memory. A study of the effect of whole body exposure vs auditory exposure to the same noise field has been initiated.

Project: 7231
Task: 03
Work Unit: 018
Organization Performing R&D: AMRL (In-house)
Title: Effects of Acoustic Stimulation on the Vestibular System

Subjective complaints of nausea and disorientation from individuals exposed to intense noise and to motion in Air Force environments continue to be reported and to interfere with mission accomplishment. This effort investigates sensitivity thresholds and tolerance to noise and motion of Air Force operations and their effect on vestibular function as related to control of disorientation and other performance decrements.

Various measures of vestibular functioning including equilibrium, perception of the vertical, counterrolling of the eyes, caloric nystagmus and nystagmus produced by electrical stimulation are examined during exposure to various types of acoustic energy consisting of discrete frequencies, broadband jet noise, infrasound, and pressure. Research involves responses of both humans and laboratory animals to vestibular excitation.

Data on effects of broadband jet noise and pure tone on human equilibrium have been reported in two technical reports (AMRL TR 66-85; AMRL TR 68-7) and two manuscripts to be published. Three experiments have been completed in which no consistent alteration in the perception of the vertical was observed as a result of broadband jet noise or pure tone exposure. Electrical stimulation of the vestibular system was found to have little influence on the perception of periodic linear acceleration. Mathematical modeling of otolith-semicircular canal interactions and of adaptation to sustained angular acceleration is proceeding for refinement and updating of the electro-mechanical model of the human vestibular system.

Project: 7231
Task: 03
Work Unit: 019
Organization Performing R&D: AMRL (In-house)
Title: Voice Communication During Air Force In-Flight and Ground Operations

Noise continues to be a major factor limiting or interfering with voice communications in the Air Force, creating serious command and control problems and safety hazards during routine as well as emergency operations. Other elements such as vibration, windblast and reduced pressure may also reduce speaker and listener performance. These studies evaluate voice communication to identify interfering factors, to determine biological limitations and to consider conventional as well as unique approaches to specific operational problems. Results will be applied to design of future military communications systems for use in high noise environments.

Adverse Air Force noise environs are simulated in the laboratory to define the nature of specific interference effects, and to provide recommendations and solutions which will minimize and eliminate the problems.

Findings are applied directly to requests for consultation from the field and are incorporated into Mil Specs for communications systems, operating procedures and voice communication criteria.

Plans are underway for a program to evaluate the relative performance of lightweight communication systems in the noises of T-39, C-130, C-135, C-141, etc., cargo aircraft at the request of the Life Support SPO. A portable 12 station, high quality listening system for use in voice communication research has been completed and a performance evaluation will be accomplished soon. A Helium Speech Processor, which was developed recently will be evaluated in-house. A technical article on speech in artificial atmospheres appeared in J. Aerospace Med., February 1969.

Project: 7231
Task: 03
Work Unit: 020
Organization Performing R&D: AMRL (In-house)
Title: Simultaneous Exposure to Acoustic Energy and Other Stressors

Acoustic exposure in the Air Force rarely occurs in the absence of other stresses; consequently, resulting behavior is due to the combined effects of noise and other stressful stimuli. The most efficient formulation of personnel protective measures requires that the contributions of the individual stimuli and their interactions be defined. This effort investigates physiological and psychological responses of humans exposed to acoustic energy occurring in combination with other stressful stimuli in order to provide measures for minimizing adverse effects of simultaneous exposure to multiple stresses in Air Force activities.

Temporary threshold shift (TTS) due to controlled acoustic exposures is predictable and the mechanisms involved in the response are well understood. This approach will cimbine controlled acoustic exposures with mechanical whole body vibration of observers to determine among other things, if TTS under the multiple stress is different from that resulting from the single acoustic stress.

An initial investigation of the effects of exposure to combined noise and vibration stimuli on temporary threshold shift has been completed. Although results were not statistically significant, a very consistent trend in the average data indicates that TTS under the combined stress conditions was slightly but consistently greater than from the acoustic stimulation only. This investigation continues with minor alterations in the experimental design and in the parameters to be observed.

Project: 7231
Task: 03
Work Unit: 021
Organization Performing R&D: Space Sciences Incorporated, Waltham, Mass.
Title: Human Orientation During Intense Noise Exposure

Equilibrium and orientation may be disturbed for AF personnel during inflight operations and intense noise exposure. Present preventive measures are only partially adequate because of a limited understanding of the complex system which maintains balance. This research provides an analytical study of the mechanism of equilibrium and will provide a mathematical model for other systems involved, such as vision. The technical objective is to provide a basis for a working model of the sensors of balance and motion to better understand how human equilibrium is disturbed by motion and noise encountered in the Air Force.

Under the present effort, the contribution of other biological systems (such as vision) to equilibrium and orientation is being defined to determine if they should be included in the electromechanical model. Those systems which improve the operation of the model and are significant to military operations will be included. The model will be used to define man's response to equilibrium and orientation problems and provide means for minimizing and eliminating such problems in Air Force applications.

Project: 7231
Task: 03
Work Unit: 022
Organization Performing R&D: Miami University, Oxford, Ohio 45056
Title: Effects on the Vestibular System of Acoustic Energy

This research on the effects of acoustical energy on vestibular functioning provides information important for understanding the conditions, and manner in which high intensity noise affects equilibrium and produces disorientation in Air Force crewmembers.

The research consists of two phases. In Phase I, observations are made on guinea pigs, rabbits, and monkeys. Acoustical effects on vestibular functioning are observed by recording head movements, postural adjustments, and eye movements. Phase II consists of an attempt to correlate vestibular responses obtained in Phase I to movement of the stapes, pressure changes in the perilymph and endolymph. Examination of the thermal changes induced by acoustical energy is investigated during this phase.

It has been demonstrated that the vestibular system can be stimulated by static pressures; the process by which this stimulation occurs has been postulated. The vestibular system pathology observed and responses elicited confirm suspected effects of acoustic energy on the system.

Project: 7231
Task: 03
Work Unit: 022
Organization Performing R&D: Battelle Memorial Institute, Columbus, Ohio
Title: Effects of Air Force Noises

Aviation noise environments generate well defined psychological responses and little defined physiological responses of people. The objective is to investigate in the laboratory the acceptability of specific approaching vs receding aircraft noises, and accompanying physiological responses that may occur. Approaching noises are much less acceptable than non-approaching sounds, yet this difference has not been quantified. This effort will quantify the psychological judgments of acceptability and identify the presence or absence of simultaneous physiological changes. Results will be utilized in the revision and updating of land use planning documents.

The approach is to measure physiological responses (heart rate, pulse, EKG, etc.) and subjective responses to noises that appear either to be approaching or not approaching observer. Exposures and responses will be documented and utilized relative to problem acoustical environments and to noise exposure and tolerance criteria for preventive and protective action.

Two studies have just been completed and data are being analyzed. One study involved the psychological aspects of subjective judgments of relative noises. The second study subject was the physiological responses to relative noises. The follow-on Phase to independently quantify any differences and determine significance will be undertaken upon completion of current data analysis.

Project: 7231
Task: 03
Work Unit: 024
Organization Performing R&D: Ohio State University Research Foundation
Columbus, Ohio
Title: Cell Changes Associated with Temporary Hearing Loss

This effort is to investigate the cause of damage to the inner ear occurring when Air Force personnel are exposed for long periods to high noise levels. It is known that at certain exposure levels there is damage to inner ear cells accompanied by permanent hearing loss; at lesser levels impairment of hearing is temporary. However, there is some evidence that continued exposure to these lesser levels may result in permanent damage. This research investigates the possibility that the inner ear cells are temporarily impaired in function because normal chemical reactions within the cells are disturbed, but this disturbance is not sufficient to destroy the cell unless prolonged. If this is the mechanism then specific drug treatment may be developed on a rational basis.

The normal distribution of oxidative enzymes in the inner ear of animals with normal hearing is determined by electron microscopy. Animals are trained to establish individual hearing thresholds and then exposed to 90 db of sound for up to 48 hours and their Temporary Threshold Shift (TTS) measured. Electron microscopy examinations are made at various time intervals following exposure. In this way the biochemical changes in the inner ear can be correlated with changes in the animal's performance.

Equipment and procedures have been completed for training chinchillas as experimental animals. A small group of animals are being trained. The technique of tissue preparation for demonstrating the chemical reactions using electron microscopy has been completed and normal tissues ar in preparation. Results are expected to guide future human research on setting hearing conservation criteria for continuous exposures (more than 8 hours per day) of Air Force personnel to noise.

Project: 7231
Task: 04
Title: Measurement of Noise and Vibration Environments

Air Force weapon systems and equipment produce high noise levels in areas where man must function (e.g., flight crews, maintenance crews, workers in offices adjacent to flightline, residents in surrounding communities). These high noise levels frequently cause serious bioacoustic problems such as hearing loss, interference with speech, work, or sleep, and general annoyance. The magnitude and character of the offensive noise environments must be known to evaluate and resolve such problems. Primary objective of this task is to define these bioacoustic environments by measurements whenever practical or by estimating using analytical means which must be developed. Secondary objective is to simulate these environments in the lab in support of research under Task 7231/03. Electrical, pneumatic and hydraulic systems are developed and used to generate the different types of noise fields required. Some Air Force systems also produce high vibration levels at crew stations which can be hazardous or interfere with performance. Third objective of the task is to define the vibration at crew stations of Air Force aircraft flying low-altitude, high-speed (LAHS) profiles and to analyze and interpret data on clear air turbulence and runway induced vibration in support of Task 7231/01. Coordination occurs with many organizations in AFSC, SAC, TAC, Hq USAF, MAC, ATC, AFLC, NASA, FAA, American National Standards Institute, aerospace industry and the scientific community.

Project: 7231
Task: 04
Work Unit: 011
Organization Performing R&D: Textron Electronics Inc, MB Electronics Division, New Haven, Connecticut
Title: Dynamic Pressure Chamber

The objective of this program is to develop and install a Dynamic Pressure Chamber for accommodating one human subject. The chamber will serve two basic purposes: (1) the simulation of the very intense infrasonic noise from rocket boosters and large jet engines for determinations of human safety, tolerance and performance in such noise fields; and (2) the measurement of basic biodynamic characteristics of the body in its response to airborne vibration, blast, and decompression.

Project: 7231
Task: 04
Work Unit: 017
Organization Performing R&D: AMRL (In-House)
Title: Mechanisms of Noise Generation, Propagation, and Reception

Many USAF operations (e.g., aircraft on the ground and inflight, engine test stands, escape systems, auxiliary equipment) produce high noise levels in areas where man must function. These levels frequently cause serious problems concerning communication, hearing loss, annoyance and performance. This work unit provides: (1) basic knowledge and engineering methods necessary to calculate these environments; and (2) quantitative information on the physical mechanics involved in the generation of speech and man's response to acoustic energy (in support of task 7231 03).

The approach employed is to conduct theoretical and experimental studies on: (1) the basic mechanisms by which acoustic energy is generated, (2) the means by which this energy is propagated, and (3) the physical response to such energy. Statistical analyses of experimental data are performed, and theoretical models are developed to arrive at generalized relationships between noise source characteristics and the aerodynamic, mechanical or thermodynamic characteristics of the source using such techniques as dynamic-similarity models or electromechanical-acoustical analogs.

Primary emphasis to date has been placed on a series of studies to measure and understand the effects of the ground plane on the noise produced at varying distances from a noise source such as an aircraft during groud runup. This effort has included a substantial literature search, several model and full scale experiments and the development of a new procedure for calculating these effects. These results are very valuable for making accurate estimates of noise fields and are being used in engineering procedures for extrapolating noise data (e.g., the current AMRL study on the C-5A aircraft) under work unit 7231 04 018. A study on the attenuation of sound by the atmosphere has been essentially completed; these results provide attenuation data applicable for different temperature and humidity ranges.

Project: 7231
Task: 04
Work Unit: 018
Organization Performing R&D: AMRL (In-house)
Title: Bioacoustic Environments of USAF Aerospace Systems

The objective of this program is to measure, define and simulate the acoustic environments produced by aircraft, rocket engines and other Air Force aerospace systems as required for the evaluation of bioacoustic problems, such as personnel protection, communication, siting of noisy facilities and community annoyance. The engineering approach used under this program is to measure, record, process, analyze and simulate the noise environments produced in flight and on the ground by aircraft, rocket engines, ground support equipment and other Air Force noise sources using high-quality analog and digital electronic instrumentation, and apply established theoretical and empirical procedures and information on source characteristics, atmospheric sound-propagation, structural noise reduction, etc., to extrapolate and predict acoustic power spectra, sound pressure spectra, perceived noise levels, speech interference levels, peak pressure levels and other such measures of acoustic phenomena.

Project: 7231
Task: 04
Work Unit: 020
Organization Performing R&D: AMRL (In-house)
Title: Vibration Environments

The objective of this program is to define the low frequency vibration environment at crew/passenger stations of USAF aerospace systems in order to ensure that laboratory simulations for the determination of human biomedical tolerance and performance criteria are applicable to operational systems. For the rigid fighter, rigid bomber, and flexible bomber classes of aircraft this endeavor will determine the crew station in-flight vibration environment during low-altitude, high-speed flight. Such data are required for tolerance studies and the development, evaluation and testing of restraint and support systems using a variety of motion devices.

Data acquisition systems are installed onboard aircraft to measure the crew station vibrations experienced in the X,Y,Z, roll, pitch and yaw axes during low-altitude, high-speed flight. Analog and/or digital techniques are used in the laboratory to determine the amplitude probability characteristics and frequency composition of the data.

Project: 7231
Task: 04
Work Unit: 023
Organization Performing R&D: Systems Research Laboratories, Inc.
Dayton, Ohio
Title: Data Acquisition System for Noise Measurement

The objective of this effort is to develop a portable, multichannel data acquisition package that can be used to measure and record acoustic and/or vibration environments on a non-interference basis. Using state of the art components and technology with a ruggedized magnetic tape recorder, the contractor will design and develop a portable, battery operated acquisition package to measure and record multiple channels of acoustic and/or vibration data.

4. Air Force Aero Propulsion Laboratory

Program Element: 62203F

Project: 3066
Task: 12
Title: Propeller Technology

Significant propeller system technology advancement is an area of major importance for V/STOL and light aircraft. The propeller technology task consists of three areas: (a) lightweight propeller and propeller/gearbox development; (b) improvement of propeller aerodynamic performance and analytical prediction techniques; (c) prediction and reduction of propeller and gearbox system noise. More specifically, near term areas of concern are: decreasing propeller/gearbox system weight through the use of high strength-to-weight ratio materials and composites; improving propeller system performance through the application of cyclic pitch and variable geometry; improving basic airfoil design for optimum performance; determining accurate static thrust prediction methods; improving noise prediction techniques through improved basic noise source theory; and improving propeller noise scaling techniques and noise reduction through utilization of unique propeller designs based on noise source theory information.

Project: 3066
Task: 12
Work Unit: 001
Organization Performing R&D: Wyle Laboratories, Huntsville, Alabama
Title: Study of Propeller Vortex Noise

This exploratory research program is directed toward developing the technology to design effective quiet propeller configurations for tactical light aircraft. The specific technical objectives of the effort are to determine the dependence of vortex noise on aerodynamic and geometric propeller blade parameters, to develop an analytical model to accurately predict propeller vortex noise, and to develop specific recommendations for the design of minimum vortex noise propeller configurations. The original experimental work of Yudin on vortex sound from rotating rods and the more recent work of Ollerhead and Lowson are being reviewed and extended to account for modern propeller airfoil shapes.

Project: 3066
Task: 12
Work Unit: 002
Organization Performing R&D: AFAPL (In-house)
Title: Propeller Acoustics Test Facility

Current requirements for quiet aircraft have generated considerable interest in the areas of propeller and rotor acoustics. Most of the experimental data generated over the past two decades was taken on simplified rigs employing engines as the propeller drive mechanism. Further investigations have indicated that these engines can have a drastic influence on the generated propeller noise spectrum.

The objective of this program is to develop a propeller acoustic test capability to measure near-field propeller noise utilizing the Air Force Aero Propulsion Laboratory's electric whirl rigs. An automated instrumentation system for acquisition, analysis, and presentation of near-field acoustic data has been developed. Performance and acoustic tests of the Lockheed YO-3A and the Allison variable camber propellers were successfully completed. These tests were used to verify the effective operation of the test facility.

Project: 3066
Task: 12
Work Unit: 005
Organization Performing R&D: AFAPL (In-house)
Title: Performance and Acoustic Testing of a Variable Camber Propeller

The objectives of this program are to determine the performance and near-field acoustic characteristics of a variable camber propeller for V/STOL applications, and to determine the advantages and disadvantages of the flapped blade concept versus the tandem blade concept for obtaining variable camber. The engineering approach employed in this program is to conduct static whirl rig performance and acoustic tests on an Allison variable camber propeller using the movable flap concept. These results will be compared with existing performance and acoustic data on the Hamilton Standard tandem blade variable camber propeller.

Project: 3066
Task: 12
Work Unit: 006
Organization Performing R&D: Hamilton Standard Division of United Aircraft
East Hartford, Connecticut
Title: Quiet Propeller Design Procedure

During the past few years considerable interest has been generated in the area of minimum noise propellers for reconnaissance/surveillance and special operations aircraft. Since these aircraft generally have low wing loading, operate at minimum acceptable flight speeds, and require moderately low propulsive power, their propellers can be operated at reduced tip speeds thereby generating less noise. However, further propeller noise reductions are necessary in order to achieve aural non-detectability at relatively low altitudes. The objective of this program is to develop a reliable design procedure to aid in the development of advanced quiet propellers. The specific technical objectives of this effort are to develop a computerized procedure for the prediction of propeller performance, noise, and detectability, and to experimentally verify the effectiveness and reliability of the procedure by fabricating and testing a representative quiet propeller.

Project: 3066
Task: 12
Work Unit: 007
Organization Performing R&D: AFAPL (In-house)
Title: Propeller Acoustics Research

The general objectives of the Aero Propulsion Laboratory's propeller noise research program are to conduct analytical and experimental investigations into the mechanics of propeller noise generation, to review existing methods of propeller noise prediction and develop improved methods where a requirement exists, and to evaluate practical methods of propeller noise reduction. The AFAPL propeller acoustics test facility will be used to obtain representative performance and acoustic data for various propeller configurations. During the current year, tests will be conducted on the Hamilton-Standard variable camber, the Lockheed QRC-Star, and the Curtiss-Wright X-19 propellers.

Project: 3066
Task: 12
Work Unit: 008
Organization Performing R&D: AFAPL (In-house)
Title: Quiet Propeller Concept Evaluation

The objective of this program is to evaluate the noise characteristics of various propeller configurations to determine the noise reduction potential of various new designs. A series of performance and acoustic tests will be conducted using the AFAPL propeller acoustics test facility. Variables to be investigated include number of blades, blade to hub phasing angles and blade length. The technology gained from this program will be used to develop quiet propellers and rotors for quiet aircraft and helicopters respectively.

Project: 3066
Task: 14
Title: Propulsion Acoustics

With the advent of larger and more powerful military aircraft propulsion systems, it becomes increasingly apparent that appropriate steps must be taken to alleviate the noise problem. Engine noise levels must be reduced in order to provide a safe working environment for ground and flight crews, to alleviate the problem of acoustically induced structural fatigue, to reduce the possibility of aural detection during combat operations, and to improve the general community environment around military air bases. In order to achieve the apparently diverging goals of low noise and high performance, continuing research efforts to develop a better understanding of the basic mechanics of noise generation are required.

The Aero Propulsion Laboratory maintains a comprehensive propulsion acoustics research and development program consisting of contracted and in-house efforts. The overall objective is to develop the technology base necessary to significantly reduce aircraft propulsion system noise with minimum associated performance and weight penalties. The work efforts under this task are directed toward two apecific goals:

a. development of quiet propulsion for reconnaissance/surveillance and special operations aircraft, and

b. reduction of propulsion system noise to support current government noise abatement efforts.

Project: 3066
Task: 14
Work Unit: 001
Organization Performing R&D: Garrett Corporation, Phoenix, Arizona
Title: Small Turbine Engine Noise Reduction

The purpose of this program is to develop the technology base necessary to effectively reduce the noise signature of existing samll turboprop and turbofan engines. Although the program is primarily aimed at light aircraft propulsion, the technology generated is directly applicable to auxilliary power unit silencing. The specific technical objectives of the effort are to accurately predict the radiated acoustic signature and aural detectability of existing turboprop and turbofan propulsion systems in the 80 to 1000 shaft horsepower class for turboprops and the 400 to 5000 pound thrust class for turbofans, to develop effective methods to minimize propulsion system aural detectability, and to determine the engine performance and weight penalties associated with the various suppression methods.

Project: 3066
Task: 14
Work Unit: 002
Organization Performing R&D: Bolt, Beranek, and Newman, Inc.
Los Angeles, California
Work Unit: 003
Organization Performing R&D: General Electric Company, Evendale, Ohio
Work Unit: 004
Organization Performing R&D: Lockheed Georgia Company, Marietta, Georgia
Title: Aircraft Engine Noise Reduction - Supersonic Jet Exhaust Noise

In order to provide the technology base required to design and develop low noise, high performance turbine engines for future military aircraft systems, a series of exploratory research programs are planned. The objective of these programs is to develop an accurate turbine engine performance/noise analytical model to determine the aero-mechanical design trades in performance that are necessary to obtain satisfactory noise reductions. The overall effort includes a thorough investigation into the fundamental mechanisms of turbine engine noise generation and will rely heavily on the results of current Department of Transportation and National Aeronautics and Space Administration engine noise reduction programs. The initial effort in this series is directed toward afterburning supersonic jet exhaust systems with operating conditions typical of supersonic transport (SST) and long range strategic (B-1) aircraft propulsion systems.

The current supersonic jet exhaust noise effort consists of three programs directed toward developing the technology to significantly reduce supersonic aircraft propulsion system noise with minimum associated performance and weight penalties. The primary objectives of these initial programs are to investigate competing mathematical models to accurately describe the aerodynamic, acoustic and performance characteristics of supersonic jets, to determine critical noise generating mechanisms for the B-1 strategic aircraft system, and to experimentally demonstrate the advanced instrumentation required to verify the analytical models being studied. Based on the results of these programs, a follow-on effort will be initiated with the following specific technical objectives:

a. The development of a thorough qualitative and quantitative understanding of supersonic jet noise processes including the interrelationship of the distribution, level, and spectra of acoustic power and the spectra and directivity of near and far-field radiated sound with the turbulent structure, local flow properties, and nozzle performance parameters.

b. The determination of the effects of internal fluctuating forces in the nozzle on the jet noise production process. These internal force fields include turbulence and unsteady combustion due to afterburning, turbomachinery, and primary combustion.

c. The formulation of specific techniques to significantly reduce supersonic jet exhaust noise with minimum associated performance and weight penalties.

Project: 3066
Task: 14
Work Unit: 005
Organization Performing R&D: Bell Aerospace Corporation, Buffalo, New York
Title: Jet Noise Reduction for Military Reconnaissance/Surveillance Aircraft

The objective of this program is to evaluate and experimentally demonstrate a unique quiet propulsion concept for advanced quiet aircraft systems. The performance and acoustic characteristics of the total propulsion system will be assessed under this effort.

5. Air Force Weapons Laboratory

Program Element: 63723F
Project: 683M
Organization Performing R&D: Aerospace Medical Research Laboratory
Wright-Patterson AFB, Ohio
Title: Computer Noise Exposure Forecasting

The objective of this project is to revise the methods in AFM 86-5, land use planning with respect to aircraft noise to predict local community response to changes in noise levels resulting from Air Force aircraft operations. Future application of these new methods will allow the locating of new aircraft to bases and the controlling of other aircraft operations in a manner to minimize noise disturbances. The approach taken will be to modify the Federal Aviation Administration's computerized noise exposure forecast (NEF) technique to allow it to predict the effect on the local community of noise caused by Air Force aircraft operations. Thus far AFRL has advertised for qualified researchers and is in the final stages of completing a procurement package. Coordination is being accomplished to conduct AMRL in-house noise measurements on Air Force Aircraft in operation.

PROGRAM ELEMENT
PROJECT/TASK FUNDING SUMMARY
($ x1000)

PROGRAM ELEMENT	PROJECT/ TASK	FY 68	FY 69	FY 70	FY 71	FY 72	FY 73	FY 74
61102F	9781/02	70	74	73	81	80	85	85
62201F	1471/02	280	280	287	290	290	310	320
62202F	7231	350	450	348	421	410	415	410
62203F	3066/12	-	-	160	75	125	125	100
	3066/14	100	100	124	470	350	400	425
63723F	683M	-	-	-	50	80	-	-
TOTAL		800	904	992	1337	1255	1335	1330

NAVY

FEDERAL NOISE PROGRAMS INFORMATION

A. Overall Program Objectives

Noise abatement of aircraft and related ground facilities and equipments.

B. Specific Programs and Research

1. Description

a. The Navy aircraft noise abatement program is divided into three general areas:

(1) Noise reduction of operating aircraft.

(2) Noise suppression for ground run-up of engines, installed in aircraft, during test operations and pre-flight checks.

(3) Noise suppression for ground post overhaul/maintenance testing of out-of-airframe engines at Naval Air Rework Facilities and Fleet Intermediate Maintenance Activities.

b. An Exploratory Development program is underway to develop a light weight, semi-portable noise suppressor for gas turbine engines based on the application of "Coanda Jet Deflection" and the phenomena of noise suppression of "Acoustic Noise Refraction" by temperature and velocity gradients in a jet flow. This development program will be useful in advancing the state of the art of noise suppression technology particularly for ground run-up of engines installed in aircraft and for post-maintenance test of engines out of airframe.

2. Objectives

a. The present state of technology in operating aircraft engine noise abatement does not permit adequate noise suppression in high performance jet engines to satisfy increased stringency in noise regulations. Since it is a problem common to the entire aviation field, FAA and NASA are taking the lead with military departments and industry providing cooperation in advancing noise reduction technology.

b. Navy maintenance activities and Naval Air Rework Facilities (NARF's) have full power aircraft ground run-up spaces. Only 12 of approximately 225 aircraft run-up pads have been provided noise suppressors. The majority of activities perform run-ups totally unabated. Design of univeral/all purpose aircraft ground run-up suppressors are not achieveable due to various aircraft configurations --- suppressors must be close-coupled to the aircraft and must not interfere with the check and test of the aircraft stablizer, flaps, flying tail, dive brakes and tailhook. It is anticipated that approximately 75% of the 225 run-up pads will be required with suppressor units.

c. Out-of-airframe testing of gas turbine engines in engine test cells at NARF's is not a problem since these test cells already have sound suppressors. Abatement of smoke and chemical emissions is expected to provide additional noise reduction -- a nucleation scrubber prototype at NARF Jacksonville indicates such reduction.

d. The Navy has 153 out-of-airframe engine test systems in use or planned for use by Fleet Intermediate Maintenance Activities. Approximately 23 of the inventory are acoustically treated including all of the turbo jet/fan permanent/demountable test systems. Noise abatement of 75% of all test systems is an objective. These involve the portable turbo jet/fan systems and the turbo shaft and turbo prop test systems.

C. Procedures

1. Identification of Program Areas and Research Needs

A Navy "Noise Abatement Committee" has been established consisting of representatives of NAVAIR, BUMED, NAVFACENGCOM and a NARF to identify problem areas and to determine requirements and priorities.

2. Specific Actions to Abate and Control Noise

a. Noise specifications for new aircraft engines are under revision to incorporate best known design requirements consistent with the state-of-noise technology.

b. Specifications for specific aircraft ground run-up noise suppressors are being developed. Suppressors for the A-7, F-4, A-4, and T-2C aircraft already have been developed.

c. "Acoustic Enclosure" designs have been developed for the turbo-shaft/prop test systems. Three prototype acoustical enclosures for different turbo shaft test systems are scheduled for erection, test and evaluation in the fall of 1971. Two semi-acoustical enclosures for turbo prop test systems were constructed in 1968/1969. Engineering design/prototype development of demountable turbo jet/fan test systems are being conducted.

d. A time-phased program plan is being prepared to support budget requirements for the development and acquisition of un-attenuated aircraft ground run-up pads and out-of-airframe test systems.

3. Procedures for Coordination with Other Federal Agencies

a. Liaison with the Air Force on noise abatement programs for aircraft run-up pads and out-of-airframe test systems is being conducted.

b. FAA, NASA, military departments and industry are cooperating in advancing noise reduction technology.

c. Liaison with EPA is being conducted on development of and compliance with standards.

4. Extent of In-House Capability

NAVAIRSYSCOM has qualified personnel to administer, manage, design, test and procure equipment to support an aircraft noise abatement program. This includes personnel at NAVAIR Headquarters, the Naval Air Engineering Center, Philadelphia, and the Naval Air Propulsion Test Center, Trenton.

D. Fiscal

1. Real Property Value of Facilities and Equipment Used for Noise Programs

Estimated average replacement value for facilities/equipment at various Naval Air Stations:

a. Gas Turbine Engine Test Cells (total value including noise suppression) at NARF's and Fleet Activities - $57.2 Million

b. Aircraft Ground Run-up suppressors at NARF's and Fleet Activities - $2.60 Million

2. Research Contracts

a. A contract was awarded to Boeing Company, Wichita in August 1971 to accomplish scale model development of the Coanda Jet Deflection system.

b. Total research and technology funding for FY 70 and FY 71 amounts to $186 Thousand.

3. Past Programs (3-5 years)

a. Aircraft Ground Run-up noise suppression in NARF's and Fleet Activities - $2.0 Million

b. Acoustically treated out-of-airframe engine test cells in Fleet Activities - $1.93 Million

4. Future Facility Costs

a. It is anticipated that about $23 Million will be required through the FY 76 time-frame to equip a minimum of 75% of the 225 Navy run-up pads with suppressor units.

b. Approximately $10.2 Million will be required through FY 75 to provide noise abatement for out-of-airframe engine test cell acoustic enclosures.

c. These cost requirements will be supplemented by Marine Corps requirements as they are developed.

DEPARTMENT OF HEALTH, EDUCATION AND WELFARE

DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
OFFICE OF THE SECRETARY
WASHINGTON, D.C. 20201

September 20, 1971

Dr. Alvin F. Meyer, Jr.
Director, Office of Noise
  Abatement and Control
Environmental Protection Agency
Washington, D. C. 20460

Dear Dr. Meyer:

Enclosed are the Department of Health, Education, and Welfare activities related to noise effects, abatement and control. These activities are associated with the health effects and protection against high noise levels.

If any additional information is required, please contact me at Area Code 202--962-2241.

Sincerely yours,

Robert D. Lanza

Robert D. Lanza
Special Assistant to the
  Assistant Secretary for
    Health and Scientific Affairs

Enclosures

FEDERAL NOISE PROGRAMS INFORMATION

I. Organizational

A. Department of Health, Education and Welfare, Social Security Administration, Baltimore, Maryland

B. Social Security Administration's Employee Health Service has used the occupational medical guidelines as described in Public Law 658, 79th Congress. Also the Bureau of Budget Circular A-71 directs heads of agencies to establish occupational health programs.

II. Functional

A. Overall program objectives relate to hearing conservation services as part of a total occupational health program. These include the objective of assessing and removing or protecting employees against environmental hazards such as noise.

B. Specific Programs and Research

1. The hearing conservation effort includes:

   a. Identification of work areas where elevated noise levels are a problem and determining operating schedules.

   b. The obtaining of entrance on duty audiograms and noise exposure history on all employees assigned to work areas of 90 dB(A) or over.

   c. Reduction in noise levels by isolating and attenuating noise producing equipment in order to reduce noise at its source and when indicated, limiting duration of exposures.

   d. Periodic audiometric review of all employees assigned to work areas with elevated noise levels. Should threshold shifts be greater than 15 decibels, employees from noisy areas are reevaluated, hearing protection checked for fit and use, and repeat audiograms obtained following at least 15 hours of noise-free exposure. Should loss persist, reassignment is considered.

   e. Personalized fitting of ear protection equipment for those employees working in areas of 90 dB(A) or more.

   f. Supervisory and employee health education pointed to use of hearing protection equipment and proper use of sound attenuating enclosures.

2. Objectives

   a. The program is moving in the direction of desired objectives. However, full long-range impact of the the program has not been assessed.

   b. Evaluation criteria consists of:

      (1) Periodic review of serial audiograms.

      (2) Repeat orientation instructions for supervisory and line personnel.

      (3) Follow-up of those employees evaluated or reassigned because of hearing loss.

C. Procedures

1. Problem areas are identified through continuous inspection tours of work areas. The health folders of employees who have demonstrated hearing loss are evaluated in terms of noise levels at work sites.

2. Specific actions to abate and control noise include:

   a. Sound absorbing media installations (ceilings, walls) to noisy areas.

   b. Sound attenuating high noise level producing machines and equipment.

   c. Evaluating new equipment prior to ordering in order to avoid high noise levels. Consult with manufacturers in the design of such equipment.

3. Coordination with other agencies is achieved through professional affiliations such as Federal Council of Medical Directors and contacts in the American Industrial Hygiene Association.

4. Inhouse capability is supplemented by consultants from both the construction and the Industrial Hygiene Specialists.

5. New procedures will include utilization of more sophisticated noise level determination equipment so as to include authentic duration exposures and to assure the most appropriate type of hearing protection equipment.

D. Future program proposals will include a more pointed coordination across agency and professional lines and indoctrination of nursing and medical staff who come in contact with employees who work in areas of high noise levels.

III. Fiscal

A. Current Program

1. Real property value of facilities and equipment used for noise programs:

Audiometer (purchased in 1966)	$1,400
Audiometers (2) FY 1971	3,700
Hearing Booth (purchased in FY 1971)	2,200
Walsh Healey Noise Exposure Meter and attachments	1,670
Sonic Ear Valves	50
Silicone Earmold Kit	375
Total	$9,395

The purchase of 3 audiometers for field is projected for FY 1972 at a cost of $1,850 each.

Maintenance of Audiometer during FY 1971 $200

Projected estimate for repair for FY 1972 $200

FEDERAL NOISE PROGRAM INFORMATION

I. Organizational

A. Department of Health, Education, and Welfare, Health Services and Mental Health Administration, National Institute for Occupational Safety and Health

B. Public Health Service Act

II Functional

1. A. Threshold Shift in Hearing from Nonoccupational Noise Source

B. This project is primarily a completion of an earlier commitment with Federal Aviation Administration to supervise a reimbursable contract study of aircraft noise effects on residents in an airport neighborhood. In addition, the final phase of a study of the effects of recreation and entertainment noise on individuals is being completed.

C. Previous commitments are being completed. Both contract and in-house studies involve primarily audiometric testing with some source measurements.

2. A. Interim Criteria for Environmental Noise Control

B. This project is the completion of an earlier commitment to draft interim noise criteria or acoustic requirements for the outdoor urban and community environment and for the indoor home environment with relevant considerations of noise effects on health, performance, safety, and comfort.

C. This objective is to be obtained through technical review and consultation.

III Fiscal

A. There is no real property or equipment devoted exclusively to these two projects. The operating budgets of these two projects (exclusive of previously funded reimbursable contracts) is about $21,000 of which about $17,000 is personnel cost and $4,000 related expenses of operation. Both projects will be completed during FY 72.

B. These projects were initiated in FY 69 and FY 70, respectively. Total expenditures exclusive of the $50,000 reimbursable contract in prior years amounts to $69,000 and there are no projected activities after FY 72.

IV. Regulation and Certification

Not applicable

FEDERAL NOISE ABATEMENT PROGRAMS

I. A. Department of Health, Education, and Welfare; Food and Drug Administration

B. Federal Food, Drug and Cosmetic Act.

II. Some activities associated with the noise level of percussion toy caps as related to toy safety. Problems encountered during the 1970 toy survey have been resolved.

III,
& IV. Not applicable.

FEDERAL NOISE ABATEMENT PROGRAMS

I. A. Department of Health, Education, and Welfare; National Institutes of Health.

B. 42 U.S.C.

II. A. Research into the pathological and physiological effects of noise (not directly applicable to request).

B. Attached 200 word Research Project summaries.

III,
& IV. Not applicable.

Prepared for the Science Information Exchange.
Not for publication or publication reference.

NOV 3 1969

U. S. Department of
HEALTH, EDUCATION, AND WELFARE
PUBLIC HEALTH SERVICE

NOTICE OF RESEARCH PROJECT

5
1NB-3782-9

PROJECT NO. (DO NOT USE THIS SPACE)
~~5 R01~~ NS 03782-09
~~OHS~~

TITLE OF PROJECT

Histopathology of Temporal Bones

GIVE NAMES, DEPARTMENTS, AND OFFICIAL TITLES OF PRINCIPAL INVESTIGATORS OR PROJECT DIRECTORS AND ALL OTHER PROFESSIONAL PERSONNEL ENGAGED ON THE PROJECT.

Rutledge, Lewis J., M.D., Principal Investigator, Department of Otolaryngology
Gonzalez, Gerardo, M.D., Co-Investigator, Department of Otolaryngology
Tabb, Harold G., M.D., Professor and Chairman, Department of Otolaryngology
Rubin, Wallace, M.D., Asso. Professor, Department of Otolaryngology
Istre, Clifton O. Jr., Ph.D., Medical Audiologist, Department of Otolaryngology

NAME AND ADDRESS OF APPLICANT INSTITUTION

Tulane University School of Medicine, 1430 Tulane Avenue, New Orleans, La. 70112

SUMMARY OF PROPOSED WORK - (200 words or less – Omit Confidential data.)

In the Science Information Exchange summaries of work in progress are exchanged with government and private agencies supporting research in the bio-sciences and are forwarded to investigators who request such information. Your summary is to be used for these purposes.

This research project is proposed to procure valuable pathologic human temporal bones for surface preparations or histologic serial sectioning and careful microscopic evaluation. The study is designed to correlate abnormal ante mortem auditory and vestibular disturbances with post mortem histopathologic changes in the inner ear.

In animals, the effects of rocket noise and the streptomyces drugs will be evaluated by electrical audiometry and surface preparation or step sections.

— Not Pd. 1971

Period for this NRP
1-70 to 12-70
mo yr mo yr
Sub-group

PROFESSIONAL SCHOOL (medical, dental, etc.) WITH WHICH THIS PROJECT SHOULD BE IDENTIFIED	SIGNATURE OF PRINCIPAL INVESTIGATOR	DATE
Medical	✓ Lewis J. Rutledge	10/21/69

Period	Amount	Period	Amount
1/70-12/70	$28,766		
			153

PUBLICATION REFERENCE

1730 M STREET, N.W. PHONE 202-381-5511
WASHINGTON, D.C. 20036

1NB-3856-9

NOTICE OF RESEARCH PROJECT

SUPPORTING AGENCY:

HEALTH EDUCATION AND WELFARE
PUBL[illegible] HEALTH SERVICE
NATIONAL INSTITUTES OF HEALTH
NATIONAL INSTITUTE OF NEUR. DIS.& STROKE

AGENCY'S NUMBER(S):

NS 03856-09

SUBGROUP P01

TITLE OF PROJECT:

AUDITORY COMMUNICATION AND ITS DISORDERS

PRINCIPAL INVESTIGATOR, ASSOCIATES AND DEPARTMENT/SPECIALTY:

HIRSH, IRA J

KIND AWARD G
DATE 700514 DISTR

RECIPIENT INSTITUTION:

CENTRAL INSTITUTE FOR DEAF

RESEARCH
SAINT LOUIS MISSOURI 63110

PERIOD FOR THIS NRP:

BEG 7010 END 7109
FY 71 FUNDS 00393224

SUMMARY OF PROJECT:

006000 CONTINUATION
007004 818 S. KINGSHIGHWAY BLVD. ST LOUIS, MISSOURI 63110
009001 DIRECTOR OF RESEARCH

Principal Investigators: I. J. Hirsh (Director); H. Davis (Electroencephalography), D. H. Eldredge (Electrophysiology); J. D. Miller (Animal Behavior and Psychology); A. F. Niemoeller (Electrical Engineering); and C. S. Watson, J. H. Mills, D. A. Ronken, L. P. Swisher, N. P. Erber, P. L. Divenyi, D. G. Drescher, G. S. Gordon, H. S. Lane, F. R. Kleffner, and A. A. Simmons.

Present studies include the following: Clinical application of evoked cortical potentials and relation of potentials to different sensory inputs; electrophysiological studies of cochlear patterns and of auditory-nerve coding; behavioral, physiological and anatomical measures of temporary and ~~permanent hearing loss in animals following exposure to~~ noise; temporal aspects of auditory perception and of auditory masking; pitch perception of sounds with changing frequencies; detection of signals in noise; discriminability of complex tonal patterns; analysis of lipreading by deaf subjects; psychological and linguistic effects and aspects of impaired hearing; development of special wireless group hearing aids and of equipment for measuring hearing-aid performance.

NOV 17 1970

09 yr - 10/1/70 - 9/30/71
393.224

RCP
~~FKF~~
SUB

PUBLICATION REFERENCE

SMITHSONIAN INSTITUTION
1730 M STREET, N.W. PHONE 202-381-5511
WASHINGTON, D.C. 20036

INB-4403-9

NOTICE OF RESEARCH PROJECT

SUPPORTING AGENCY:

HEALTH EDUCATION AND WELFARE
PUBL HEALTH SERVICE
NATIONAL INSTITUTES OF HEALTH
NATIONAL INSTITUTE OF NEUR. DIS.& STROKE

AGENCY'S NUMBER(S):

NS 04403-09

SUBGROUP R01

TITLE OF PROJECT:

THE DETERMINATION OF SUSCEPTIBILITY TO HEARING LOSS

PRINCIPAL INVESTIGATOR. ASSOCIATES AND DEPARTMENT/SPECIALTY:

WARD, W DIXON

KIND AWARD G
DATE 700514 DISTR

RECIPIENT INSTITUTION:

MINNESOTA UNIVERSITY OF
MEDICAL SCHOOL
OTOLARYNGOLOGY DEPT.
MINNEAPOLIS MINNESOTA 55455

PERIOD FOR THIS NRP:

BEG 7012 END 7111
FY 71 FUNDS 00029626

SUMMARY OF PROJECT:

006000 CONTINUATION
007004 303 ADMINISTRATION BLDG MINNEAPOLIS, MINNESOTA 55455
009001 RESEARCH PROFESSOR

W. Dixon Ward, Ph. D.; Professor, Department of Otolaryngology
Ar[illegible] J. Duvall, III, M. D.; Professor, Department of Otolaryngology
Da[illegible]d A. Nelson, Ph. D.; Research Associate, Department of Otolaryngology

This research will examine in the chinchilla the relations among (1) the temporary changes in auditory sensitivity caused by severe but subtraumatic exposures to noise, (2) the permanent changes in sensitivity produced by a more severe noise exposure, and (3) the structural and ultrastructural changes observed in the affected cochleae. Behavioral testing is accomplished by means of conditioned-avoidance techniques. Particular attention will be paid to possible histological sequelae of noise exposure that are not associated with a loss of auditory sensitivity. The fundamental question, however, is: Can individual differences in temporary effects of noise be used to predict individual differences in resistance to permanent effects from more severe exposures?

FEB 9 1971

09 yr. 12/1/70 - 11/30/71
$ 29,626

~~AGY~~
~~RCP~~
SUB
~~GRD~~

PUBLICATION REFERENCE

SMITHSONIAN INSTITUTION
1730 M STREET, N.W. PHONE 202-[illegible]-5511
WASHINGTON, D.C. 20036

NOTICE OF RESEARCH PROJECT

INB-5083-8

SUPPORTING AGENCY: HEALTH EDUCATION AND WELFARE PUBLIC HEALTH SERVICE NATIONAL INSTITUTES OF HEALTH NATIONAL INSTITUTE OF NEUR. DIS.& STROKE	AGENCY'S NUMBER(S): NS 05083-08 SUBGROUP R01

TITLE OF PROJECT:
INFLUENCE OF THE TYMPANIC MUSCLE INTEGRITY

PRINCIPAL INVESTIGATOR, ASSOCIATES AND DEPARTMENT/SPECIALTY:
HAYDEN, ROYAL C, JR

KIND AWARD G
DATE 700514 DISTR

RECIPIENT INSTITUTION:
HENRY FORD HOSPITAL - NON-AFFL.
OTOLARYNGOLOGY DEPT.
DETROIT MICHIGAN 48202

PERIOD FOR THIS NRP:
BEG 7101 END 7112
FY 71 FUNDS 00012111

SUMMARY OF PROJECT:

006000 CONTINUATION
007004 2799 W GRAND BLVD DETROIT, MICHIGAN 48202
009001 OTOLOGY CONSULTANT CO-DIR, OTOLOGICAL RES LAB

Royal C. Hayden, Jr., M.D. Otology Consultant Co-Director, Otology Res. Lab. Henry Ford Hospital and Adjunct Assistant Professor, Otolaryngology Dept., Wayne State University Medical School	Donald N. Elliott, Ph.D. Director, Otology Res. Lab. Henry Ford Hospital and Professor of Psychology Department of Psychology Wayne State University	Larry A. Frazier, M.A. Assistant Director and Research Associate Otology Research Lab. Henry Ford Hospital

The purpose of this project is to continue the work previously carried out in evaluating the effects of integrity of middle ear muscles and the effect of tympanic membrane elevation and rehealing on stimulation induced temporary and permanent hearing threshold shifts. Specifically, the behavioral audiograms of conditioned monkeys after exposure to high intensity low frequency noise, impulse noise, and combination of the two will be compared before and after elevation of the tympanic membrane, as well as sectioning the middle ear muscles. Recovery curves of the hearing loss will be followed in their return to a normal or permanent hearing loss state. The temporal bones of all animals will be removed and histologically processed for microscopic study.

FEB 9 1971

08 yr. 1/1/71 - 12/31/71
$ 12,111

~~AGY~~
[illegible]
~~GRD~~

NOT FOR PUBLICATION OR PUBLICATION REFERENCE

SCIENCE INFORMATION EXCHANGE
SMITHSONIAN INSTITUTION
1730 M STREET, N.W. • PHONE 202-381-5511
WASHINGTON, D.C. 20036

SIE NO.
S
1NB-5785-6

NOTICE OF RESEARCH PROJECT

SUPPORTING AGENCY:
HEALTH EDUCATION AND WELFARE
PUBLIC HEALTH SERVICE
NATIONAL INSTITUTES OF HEALTH
NATIONAL INSTITUTE OF NEUR. DIS.& STROKE

AGENCY'S NUMBER(S):
NS 05785-06
SUBGROUP P01

TITLE OF PROJECT:
CAUSES OF DEAFNESS

PRINCIPAL INVESTIGATOR, ASSOCIATES AND DEPARTMENT/SPECIALTY:
LAWRENCE, MERLE

KIND AWARD G
DATE 700514 DISTR

RECIPIENT INSTITUTION:
MICHIGAN UNIVERSITY OF
MEDICAL SCHOOL
OTORHINOLARYNGOLOGY DEPT
ANN ARBOR MICHIGAN 48104

PERIOD FOR THIS NRP:
BEG 7009 END 7108
FY 71 FUNDS 00355576

SUMMARY OF PROJECT:
006000 CONTINUATION
007004 ADMINISTRATION BUILDING ANN ARBOR, MICHIGAN 48104
009001 DIR, KRESGE HEARING RES INST & PROF OF OTORHINOL

This grant supports the basic activities of the Kresge Hearing Research Institute. It supports the salaries of many of the principal investigators and trained personnel. Technical help and other items specific to a particular research area are provided for by other grants.

The areas of study within the Institute at the present are as follows: General Psychoacoustics, general auditory physiology (electrical potentials and fluid exchange); Cytoarchitecture of the organ of Corti (phase and electron microscopy); comparative psychoacoustics (behavioral determinations of hearing in animals before and after experimental procedures); neurophysiological correlates of hearing; laryngeal transplantation and facial nerve physiology; histopathology of the temporal bone; psychoacoustics, and vestibular physiology.

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Carbon dioxide diffusion across the tympanic membrane: A spec photometric analysis of carbon dioxide diffusion across the tympanic brane has been developed. Additional cases with differing ear patho are being studied to learn the significance of CO_2 diffusion.

Viral localization in the inner ear: Surface preparations are be prepared to study if and where viruses localize in the inner ear.

Cleft palate and otitis media: All patients with cleft palate ar being evaluated for middel ear disease. Clinical-operative correlatio of ear disease are being made. Cytologic analysis of the middle ear fluid is performed also.

Alfred L. Nuttall, M.S.E.E. - This research on the middle ear musc involves examination of the dynamics o the guinea pig middle ear transfer function to provide the data for formulating a middle ear model that incorporates the muscle activity. Toward this end, much of this past years' work has been concerned with the design, construction, and calibration of the necessary instrumentation.

A solid state phase angle meter, capable of reading the relative phase of a signal over a 360 degree range, is ready for use. Between the frequency limits of 10 Hz to 20 kHz the signal can have a dynamic amplitude range of 50 dB.

An electromechanical vibrator, for the direct application of mechanical displacement to the stapes has been constructed. Longitudi displacements of less than 100 Å are possible over the frequency rang of 50 Hz to 2500 Hz. The displacement is calibrated for magnitude an phase.

Experiments on guinea pigs this year have resulted in the succes direct electric stimulation of the stapedius and tensor tympani muscle with metal bipolar electrodes. The transfer function magnitude and ph changes, caused by muscle contraction, are being recorded.

James L. Werth, M.D. - The magnitude of the air pressure waves produc by modern industrial and military explosions is several times larger than the pressures that ordinarily stimulate the human ear. It can be anticipated that these high pressures will produ middle ear damage and inner ear disturbances.

In this investigation test animals were subjected to a single air pressure wave ranging from 15-45 psi. Specimens have been collected from animals immediately following subjection to the test wave and fro other animals several weeks following the injury. Histological study o several specimens has been completed. The most profound damage found i the specimens studied has been in the basal turn of the cochlea.

BEHAVIORAL

David B. Moody, Ph.D. - Our research during the past year has concentrated on the study of experimentally produce hearing loss in primates. These losses have been produced by both

Prepared for the Science Information Exchange.

Not for publication or publication reference.

U. S. Department of
HEALTH, EDUCATION, AND WELFARE
PUBLIC HEALTH SERVICE

NOTICE OF RESEARCH PROJECT

PROJECT NO. (DO NOT USE THIS SPACE)

~~5 R01~~ NS 07908-05

~~GMS~~

TITLE OF PROJECT

NOISE INDUCED DEAFNESS—MASKING AND SPEECH PERCEPTION

GIVE NAMES, DEPARTMENTS, AND OFFICIAL TITLES OF PRINCIPAL INVESTIGATORS OR PROJECT DIRECTORS AND ALL OTHER PROFESSIONAL PERSONNEL ENGAGED ON THE PROJECT.

Kryter, Karl D., Ph.D.	Sensory Sciences Research Center	- Director
Becker, Richard W., M.S.	" " " "	- Research Psychologist
Bell, Donald W., Ph.D.	" " " "	- Research Psychologist
Clarke, Frank R., Ph.D.	" " " "	- Sr. Research Psychologist
Hecker, Michael H.L., M.S.	" " " "	- Sr. Research Engineer
Kreul, E. James, Ph.D.	" " " "	- Sr. Research Audiologist

NAME AND ADDRESS OF APPLICANT INSTITUTION

Stanford Research Institute
333 Ravenswood Avenue
Menlo Park, California 94025

SUMMARY OF PROPOSED WORK - (200 words or less — Omit Confidential data.)

In the Science Information Exchange summaries of work in progress are exchanged with government and private agencies supporting research in the bio-sciences and are forwarded to investigators who request such information. Your summary is to be used for these purposes.

The general objective is the understanding of the performance characteristic of the normal human ear and the ear that suffers from hearing loss, primarily noise-induced deafness. The principal research approaches to be used to meet this objective are:

1. To study and explore, by means of perceptual tests, under controlled laboratory conditions, the relative capacities of the normal and deafened ear to detect and discriminate simple and complex acoustical signals. The tests will be designed to define and delineate most probable underlying neuro-physiological mechanisms involved in such discriminations in the normal and deafened ear.

2. To study the ability of persons with normal hearing and persons with deafness to understand speech that has been narrow-pass-band filtered and processed in various ways. It is hypothesized that the speech may be made more understandable to the deafened ear as the result of processing and "packaging" the speech signal in either or both the frequency-amplitude and time domains in ways that might best match the remaining performance characteristics of the deafened ear.

3. To test and evaluate the knowledge gained in the proposed research for the alleviation of hearing loss sustained in industry and elsewhere due to exposure to excessive noise.

Period for this NRP
5-70 to 4-71
mo yr to yr
Sub-group

06 yr. 5/1/71-4/30/7
$125,287

PROFESSIONAL SCHOOL (medical, dental, etc.) WITH WHICH THIS PROJECT SHOULD BE IDENTIFIED

SIGNATURE OF PRINCIPAL INVESTIGATOR
Karl D Kryter

DATE
25 Feb 1972

. No.	Period	Amount	Proj. No.	Period	Amount
	5/70-4/71	$123,018	6		$81,379 *
			7		84,051 *
					*
					*
					*
					*
*Commitment					*

DHEW NOISE RESEARCH AND RELATED ACTIVITIES FOR 1971 AND PLANS FOR 1972

I. National Institute for Occupational Safety and Health

A. Projects listed below were conducted during FY 71 and are planned to continue into FY 72. Contract funding information is shown in Table I.

1. Occupational Noise and Hearing Survey: This is a continuing study aimed at establishing relationships between representative types of industrial noise conditions, years of exposure, and hearing levels of workers as a basis for documenting criteria for safeguarding hearing. An additional aim is to ascertain prevalence of hearing impairment in different worker groups. All work performed on this project for FY 71 was conducted in-house, including noise surveys and hearing evaluations on 600 workers engaged in jobs connected with road repair, printing, steel product manufacturing, and transportation services. With regard to the latter, FY 72 plans will include in-house noise and hearing studies of trucking operations which may have some bearing on DOT proposed noise limits for the driver compartments of commercial vehicles. FY 72 plans also include two contracts, one calling for an evaluation of serial audiometric data available on workers who have been exposed six to twelve years to known levels of mining noise; another contract may deal with hearing losses among workers exposed to intermittent noise conditions.

2. Threshold Shifts in Hearing from Non-Occupational Noise Exposures: This is a continuing project seeking to assess risk of hearing loss caused by exposures to off-job noise conditions. Accomplishments in FY 71 included in-house surveys of sound levels in nine separate rock-and-roll sessions with pre- and post-exposure hearing measurements on a total of 44 teenage musicians and 162 teenage spectators. Via an interagency arrangement with FAA and by means of a contract, audiograms together with a noise history questionnaire and

otoscopic check are being obtained on residents in a noise impacted neighborhood bordering L.A. Airport. Similar information is being collected on residents in a control neighborhood 30 miles away. In addition, measurements of background and intrusive noise levels from aircraft are being made in both communities. A contract study is presently being negotiated which will furnish hearing data on 100 or more young adults engaged in noisy recreational activities such as rock-and-roll music playing, drag strip racing, cycling, shooting. Hearing measurements here will include thresholds at high frequencies much beyond the conventional audiometric range.

3. Industrial Noise and Medical-Safety-Attendance Data on Workers: This project seeks to determine if there is any evidence coupling severity of occupational noise conditions to the occurrence of extra-aural physical and behavioral disturbances in workers. Accomplishments during FY 71 on this project was to plan a contract study to uncover this information through comparing entries in the existing medical, safety, and attendance records of at least 500 workers employed in noisy jobs and 500 in quiet ones. FY 71 funds will cover this contract. Contingent on the possible inadequacies found in existing medical records of in-plant workers to furnish needed health information on this project, it may be necessary to perform clinical examinations for this purpose. Plans to obtain such data via contracts have been noted in FY 72 project planning.

4. Aspects of Noise and Psycho-Physiologic Response: This research project attempts to clarify physiologic and subjective reactions elicited by sounds which differ greatly in acoustic quality, perceived meaning and purposefulness. Specific questions to be considered in this project include the following:

a. Do aversive types of sounds cause distinctively different physiological changes from those of a more neutral nature?

b. What is the degree of correlation between physiologic reactions to these different sounds and subjective ratings of their annoyance?

c. Is there adaptation of both physiologic and subjective reactions to these sounds with repeated or prolonged exposures or does the time course of these reactions differ?

d. How may positive or negative associations given a certain sound affect resultant subjective and underlying physiologic responses?

During FY 71 a study plan was prepared to research these questions via contract. Contract negotiation is now underway and this project is expected to be funded by the end of FY 71 and to be conducted in FY 72. Expanded effort in this area will be dependent upon the results of the first contract study.

5. Interim Criteria for Environmental Noise Control: The intent of this project is to formulate interim noise criteria or acoustic requirements for the workplace, for the outdoor urban or community environment, and for the indoor or home environment within the frame work of existing knowledge of noise effects on health, work efficiency and safety, comfort, and well-being. During FY 71, an outlined approach to this project was drafted by DHEW and reviewed by CHABA scientists selected to assist in this task. Progress on the part of DHEW in attempting to prepare a first whole draft of this document has been delayed owing to the imposition of administrative assignments. New attempts will be made in FY 72 to follow through on this project.

6. Aspects of Noise Disturbance to Sleep: This study was an exploratory investigation of the effects of noise on sleep and post-sleep behavior in two 25, 50, and 70 year old males. FAA supplied $55,000 for this project which was supervised by DHEW under an interagency agreement and carried out via contract with the University of Cincinnati. During FY 71, the study was completed and a technical report summarizing results prepared for publication.

7. Advisory-Consultative-Training Services on Noise Problems and their Control: Under this project, staff offers consultation to state and local agencies in development of needed noise control programs and plans and directs training programs, workshops dealing with evaluation, recognition and control of noise. It also supplies technical and general information on noise to government agencies and the general public.

B. The projects listed below represent new activities planned for FY 72. Contract funding levels for these projects are shown in Table I.

1. Survey of High Frequency Noises in the Work Environment: This study will (a) inventory types of industrial processes and equipment which emit noises with high frequency concentrations of acoustic energy (above 10 KHz); (b) describe instrumentation and procedures for defining worker exposures to such sound energy, and (c) obtain representative measurements in work areas where the operating equipment is in use. It is planned to conduct this work via contract during FY 72.

2. Survey of Hearing Conservation Programs in Industry: The aim of this project is to survey hearing conservation practices in various industries. Data will be sought reflecting the number of programs presently in operation and specific procedural details such as audiometers used, their maintenance, audiometric testing procedures, aspects of personal protection and engineering control efforts. In addition, on-site inspections and calibration of audiometers in use, noise measurements of test areas, will be made in a selected number of companies for purposes of adding depth to the information gathered from the questionnaire. This questionnaire survey is designed to begin early in FY 72 and will be strictly an in-house activity.

3. Impact-Type Noise Exposure and Control in Industry: Via an FY 72 contract, an attempt will be made (a) to identify types of manufacturing-construction equipment and processes which generate strong impact-type sounds, (b) to prescribe instrumentation and procedures for best describing such sounds, and (c) to obtain field data representative of worker exposures to these impact noise sources. Subsequent to the results of this contract effort, another contract study will consider available means for reducing impact noise generations at the source, and demonstrate on select industrial machines or equipment the amount of quieting achieved through application of these treatments. The latter contract work will be funded in FY 73.

4. Noise Effects on Non-Auditory Sensory Functions and Performance: This project is designed to evaluate in the laboratory certain measures of visual, tactile, thermal, kinesthetic and vestibular functions that may be effected by industrial-type noises and aspects of response accommodation with continued exposure to such noise. In addition, an assessment will be made of performance or safety implications of these noise-induced changes through study of simulated job tasks incorporating specific function or functions affected. This work will be done on a contract basis beginning in FY 72.

5. Temporary Threshold Shift in Hearing from High Level Noise Exposures: This project for FY 72 will involve two studies to be undertaken on an in-house basis. One will be a laboratory study to determine the degree of temporary threshold shift resulting from high level low frequency noise exposure in normal listeners. The intent of this work will be to evaluate the adequacy of dBA sound level measures in rating hearing loss risk from industrial noises with prominent low frequency energy. A second study will involve the use of groups of workers exposed to high level noise in their work environments whose hearing will be tested both before and after work each day for two weeks so as to determine the growth and decay of noise-induced temporary threshold shifts in hearing under normal work conditions. Hearing testing here will include frequencies in the conventional audiometric range as well as at select high frequencies. The latter testing will be done in different work situations sampling a variety of exposure conditions.

6. Aspects of Ear Tolerance to Noise: A first study included in this project will seek to identify at least 100 workers whose ears, while unprotected, show little if any hearing loss despite 10 or more years exposure to industrial noise of high level. Such workers will be subjected to clinical exams, otologic and related evaluative tests seeking to uncover distinctive factors which may explain their resistance to ear damage from noise. This study will be conducted during FY 72 on a contract basis.

7. Guides to Noise Control: Via contract, two guides for noise control will be prepared. One is to summarize information on materials for industrial noise control purposes and a second is to offer basic principles of noise control and cite case histories of implementation and effectiveness. This work is to be handled by two contracts to be negotiated during FY 72.

C. The projects listed below are supported by grants through the National Institute for Occupational Safety and Health. FY 71 and projected FY 72 funding levels are noted in Table I.

1. Damage Risk Criteria for Intermittent Noise Exposure (W.D. Ward, University of Minnesota): Research will evaluate growth and recovery of temporary noise-induced threshold shifts in hearing for intermittent noise exposures over an 8-hour period. Determination of noise levels, duty cycles which cause threshold shifts subject to complete recovery in the 16-hour period between two successive 8-hour exposures will define occupational noise limits for intermittent exposures.

2. Training Program in Acoustic Environmental Control (K. Stewart, University of Pittsburgh): Pre-doctoral inter-disciplinary program aimed at developing acoustic specialists in handling noise problems in industry, housing, transportation, schools, hospitals and the community at large.

3. Behavioral Toxicity of Noise in Immature Mice (W.B. Iturrian, University of Georgia): Investigation of sensitization of immature mice to audiogenic seizure and to assess the effects of high level sounds on pesticide toxicity, drug effectiveness and on their overall behavior.

4. Effects of Three Sound Environments on Human Behavior (H.D. Warner, University of Missouri): Evaluation of three representative noise conditions on realistic work tasks for time periods resembling actual work situations.

5. Responses of the Pre-Damaged Ear (P.N. Herman, University of Oregon Medical School): Study to evaluate the effects of acoustic over-stimulation on animal ears which have already been subject to temporary or permanent threshold shifts due to noise.

6. An Objective Method for Evaluating Ear Protectors (P. Michael, Penn State University): Study to cross-compare and evaluate objective and subjective procedures for establishing attenuation properties of both insert and earmuff protectors.

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D. Also supported by the National Institute for Occupational Safety and Health are three noise projects dictated by requirements of the Federal Coal Mine Health and Safety Act. These projects deal with development of health standards for controlling noise hazards in mining, establishment of noise survey and monitoring procedures for mining operations, and promotion of methods for engineering noise control in mining equipment. For FY 72, it is planned to negotiate at least two contracts in these subject areas totalling $105,000.

II. Health Services and Mental Health Administration (National Institute for Mental Health)

This agency is supporting one research grant, "Physiologic and Psychologic Adjustment to Noise" (K.D. Kryter, F.R. Clarke, Stanford Research Institute) which is in its second year of work. Funding for the period 6/1/70 - 5/30/71 was $45,394. For the next twelve month period 6/1/71 - 5/30/72, funding is expected to be $73,000. Essence of study is to monitor noise effects on performance and underlying physiologic measures on a long-term basis. Subjects varying in age, sex, sensitivity to noise will be involved in this effort as will samples of everyday noises.

III. National Institutes of Health (National Institute for Neurologic Diseases and Stroke (NINDS)

NIH through NINDS supports grant research related in part to sound and noise as it may affect speech perception and hearing. Attachment A contains a listing of active research grants in these areas spanning the FY 71 - FY 72 time period. Actual or expected funding levels are listed. The list includes 18 active grants whose current awards total $1,874,471.

TABLE I

FY 71 AND PROJECTED FY 72 CONTRACT AND GRANT FUNDS FOR NOISE PROJECTS IN NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH

	In-House or Contract Project	FY 71	FY 72
1.	Occupational Noise and Hearing Survey	in-house	75K
2.	Threshold Shifts in Hearing from Non-Occupational Noise Exposures	75K*	---
3.	Industrial Noise and Medical-Safety-Attendance Records on Workers	60K	150K
4.	Aspects of Noise and Psycho-Physiologic Response	45K	---
5.	Interim Criteria for Noise Control	in-house	in-house
6.	Aspects of Noise Disturbance to Sleep	completed	
7.	Advisory-Consultative-Training Services on Noise Problems and Control	in-house	in-house
8.	Survey of High Frequency Noises in Work Environment	---	60K
9.	Survey of Hearing Conservation Programs in Industry	---	in-house
10.	Impact-Type Noise Exposure and Control in Industry	---	60K
11.	Noise Effects on Non-Auditory Sensory Functions and Performance	---	75K
12.	Temporary Threshold Shift in Hearing from High Level Noise Exposures	---	in-house
13.	Aspects of Ear Tolerance to Noise	---	50K
14.	Guides to Noise Control	---	73K

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* 50K obtained via interagency agreement from FAA.

TABLE I (continued)

	Research or Training Grant	FY 71	FY 72
1.	Damage Risk Criteria for Intermittent Noise Exposure	40K	33K
2.	Training Program in Acoustic Environmental Control	102K	100K
3.	Behavioral Toxicity of Noise in Immature Mice	10K	---
4.	Effects of Three Sound Environments on Human Behavior	---	7K
5.	Responses of Pre-Damaged Ear	---	26K
6.	An Objective Method for Evaluating Ear Protectors	30K	30K

ATTACHMENT A

ACTIVE NINDS RESEARCH GRANTS--KEYDEXED (Indexed) on NOISE

*(NS 3782 and NS 6459 also on Sound Trauma Deafness)

5/24/71

TYPE	GRANT NUMBER PROGRAM CLASS	GRANT PERIOD	PRINCIPAL INVESTIGATOR, INSTITUTION LOCATION, PROJECT TITLE	IRG	FY PD		FUNDS
5	R01 NS 03451-10 2B -F1-C	01-01-71 12-31-71	SINGLETON, GEORGE T UNIVERSITY OF FLORIDA GAINESVILLE FLORIDA RANDOM NOISE ANALYSIS IN VESTIBULAR EVALUATION	CMS	71	CURR AWARD 1ST FUT YR 2ND FUT YR 3RD FUT YR 4TH FUT YR	31,721 20,790 30,647 0 0
* 5	R01 NS 03782-09 2B -A5-C	01-01-70 04-30-71	GONZALEZ, L GERARDO TULANE UNIVERSITY NEW ORLEANS LOUISIANA HISTOPATHOLOGY OF TEMPORAL BONES	CMS	70	CURR AWARD 1ST FUT YR 2ND FUT YR 3RD FUT YR 4TH FUT YR	28,766 0 0 0 0
3	R01 NS 03782-09S1	01-01-70 01-07-71	GONZALEZ, L GERARDO TULANE UNIVERSITY NEW ORLEANS LOUISIANA HISTOPATHOLOGY OF TEMPORAL BONES	CMS	71	CURR AWARD 1ST FUT YR 2ND FUT YR 3RD FUT YR 4TH FUT YR	0 0 0 0 0
	2B -A5-C						
5	R01 NS 05464-07 2B1-F1-C	01-01-71 12-31-71	PICKETT, JAMES M GALLAUDET COLLEGE WASHINGTON DIST OF COL PERCEPTION OF COMPLEX AUDITORY STIMULI BY THE DEAF	CMS	71	CURR AWARD 1ST FUT YR 2ND FUT YR 3RD FUT YR 4TH FUT YR	66,896 58,870 60,944 0 0
* 5	P01 NS 06459-06 2C -E4-C	02-01-71 01-31-72	MOORE, PAUL UNIVERSITY OF FLORIDA GAINESVILLE FLORIDA A COMMUNICATION SCIENCES RESEARCH PROGRAM	NSPB	71	CURR AWARD 1ST FUT YR 2ND FUT YR 3RD FUT YR 4TH FUT YR	225,339 218,234 0 0 0
5	R01 NS 06940-06 2B1-F1-C	12-01-70 11-30-71	GREEN, DAVID M UNIV OF CALIFORNIA SAN DIEGO SAN DIEGO CALIFORNIA MASKING MECHANISMS	CMS	71	CURR AWARD 1ST FUT YR 2ND FUT YR 3RD FUT YR 4TH FUT YR	44,355 0 0 0 0
2	P15 NS 07790-04 2D1-E3-C	01-01-71 12-31-71	DILGER, ROBERT C PITTSBURGH-UNIVERSITY OF PITTSBURGH PENNSYLVANIA AUDITORY DYSFUNCTION THE COCHLEA	NSPB	71	CURR AWARD 1ST FUT YR 2ND FUT YR 3RD FUT YR 4TH FUT YR	89,461 73,037 73,759 75,097 77,371
5	R01 NS 09029-02 2-E6-C	01-01-71 12-31-71	SCHUBERT, EARL D STANFORD UNIVERSITY STANFORD CALIFORNIA LISTENER CHARACTERIS[illegible]S IN AUDITORY DETECTION	CMS	71	CURR AWARD 1ST FUT YR 2ND FUT YR 3RD FUT YR 4TH FUT YR	43,428 0 0

ACTIVE NINDS RESEARCH GRANTS--KEYDEXED (Indexed) on SOUND TRAUMA DEAFNESS

5/24/71

(NS 3782 and NS 6459 also on Noise)

TYPE	GRANT NUMBER PROGRAM CLASS	GRANT PERIOD	PRINCIPAL INVESTIGATOR, INSTITUTION LOCATION, PROJECT TITLE	IRG	FY PD	FUNDS	
5	R01 NS 02167-12 202-83-C	09-01-70 08-31-71	SIMMONS, F BLAIR STANFORD UNIVERSITY STANFORD CALIFORNIA CORRELATIONS OF ELECTROPHYSIOLOGICAL MEASURES OF HEARING	CMS	71	CURR AWARD 1ST FUT YR 2ND FUT YR 3RD FUT YR 4TH FUT YR	50,752 41,895 0 0 0
* 5	R01 NS 03782-09 28 -AS-C	01-01-70 04-30-71	GONZALEZ, L GERARDO TULANE UNIVERSITY NEW ORLEANS LOUISIANA HISTOPATHOLOGY OF TEMPORAL BONES	CMS	70	CURR AWARD 1ST FUT YR 2ND FUT YR 3RD FUT YR 4TH FUT YR	28,766 0 0 0 0
3	R01 NS 03782-09S1 28 -AS-C	01-01-70 01-07-71	GONZALEZ, L GERARDO TULANE UNIVERSITY NEW ORLEANS LOUISIANA HISTOPATHOLOGY OF TEMPORAL BONES	CMS	71	CURR AWARD 1ST FUT YR 2ND FUT YR 3RD FUT YR 4TH FUT YR	0 0 0 0 0
5	P01 NS 03856-09 2R1-E3-C	10-01-70 09-30-71	HIRSH, IRA J CENTRAL INSTITUTE FOR DEAF SAINT LOUIS MISSOURI AUDITORY COMMUNICATION AND ITS DISORDERS	NSPB	71	CURR AWARD 1ST FUT YR 2ND FUT YR 3RD FUT YR 4TH FUT YR	393,224 420,535 440,162 460,770 0
5	R01 NS 04403-09 281-AS-C	12-01-70 11-30-71	WARD, W DIXON MINNESOTA UNIVERSITY OF MINNEAPOLIS MINNESOTA THE DETERMINATION OF SUSCEPTIBILITY TO HEARING LOSS	CMS	71	CURR AWARD 1ST FUT YR 2ND FUT YR 3RD FUT YR 4TH FUT YR	29,626 28,275 0 0 0
5	R01 NS 05065-08 28 -AS-C	01-01-71 12-31-71	HAWKINS, JOSEPH E, JR MICHIGAN UNIVERSITY OF ANN ARBOR MICHIGAN MICROSCOPIC STUDIES OF THE INNER EAR	CMS	71	CURR AWARD 1ST FUT YR 2ND FUT YR 3RD FUT YR 4TH FUT YR	53,396 40,667 0 0 0
5	R01 NS 05083-08 281-E3-C	01-01-71 12-31-71	HAYDEN, ROYAL C, JR HENRY FORD HOSPITAL DETROIT MICHIGAN INFLUENCE OF THE TYMPANIC MUSCLE INTEGRITY	CMS	71	CURR AWARD 1ST FUT YR 2ND FUT YR 3RD FUT YR 4TH FUT YR	12,111 0 0 0 0

ACTIVE NINDS RESEARCH GRANTS--KEYDEXED (Indexed) on SOUND TRAUMA DEAFNESS

* (NS 3782 and NS 6459 also on Noise)

5/24/71

TYPE	GRANT NUMBER PROGRAM CLASS	GRANT PERIOD	PRINCIPAL INVESTIGATOR, INSTITUTION LOCATION, PROJECT TITLE	IRG	FY PD		FUNDS
5	P01 NS 05795-06 2B1-A5-C	09-01-70 08-31-71	LAWRENCE, MERLE MICHIGAN UNIVERSITY OF ANN ARBOR MICHIGAN CAUSES OF DEAFNESS	NSPA	71	CURR AWARD	355,576
						1ST FUT YR	367,512
						2ND FUT YR	0
						3RD FUT YR	0
						4TH FUT YR	0
* 5	P01 NS 06459-06 2C -E4-C	02-01-71 01-31-72	MOORE, PAUL UNIVERSITY OF FLORIDA GAINESVILLE FLORIDA A COMMUNICATION SCIENCES RESEARCH PROGRAM	NSPB	71	CURR AWARD	225,339
						1ST FUT YR	218,234
						2ND FUT YR	0
						3RD FUT YR	0
						4TH FUT YR	0
5	R01 NS 07908-05 2B1-F1-C	05-01-70 04-30-71	KRYTER, KARL D STANFORD RESEARCH INST MENLO PARK CALIFORNIA NOISE-INDUCED DEAFNESS--MASKING AND SPEECH PERCEPTION	CMS	70	CURR AWARD	123,018
						1ST FUT YR	81,299
						2ND FUT YR	84,051
						3RD FUT YR	0
						4TH FUT YR	0
5	R01 NS 08000-03 2B2-C3-C	04-01-70 03-31-71	MATSCHINSKY, FRANZ M WASHINGTON UNIVERSITY SAINT LOUIS MISSOURI ENERGY METABOLISM OF AUDITORY SENSORY STRUCTURES	CMS	70	CURR AWARD	31,382
						1ST FUT YR	0
						2ND FUT YR	0
						3RD FUT YR	0
						4TH FUT YR	0

TYPE	GRANT NUMBER PROGRAM CLASS	GRANT PERIOD	PRINCIPAL INVESTIGATOR, INSTITUTION LOCATION, PROJECT TITLE	IRG	FY PD	FUNDS	
5	R01 NS 02974-10 202-F1-C	02-01-71 01-31-72	STEVENS, S SMITH HARVARD UNIVERSITY CAMBRIDGE MASSACHUSETTS PSYCHOPHYSICS AND HEARING	CMS	71	CURR AWARD 1ST FUT YR 2ND FUT YR 3RD FUT YR 4TH FUT YR	41,315 0 0 0 0

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
WASHINGTON, D. C. 20410

OFFICE OF THE UNDER SECRETARY

IN REPLY REFER TO:

SEP 27 1971

Dr. Albert F. Meyer, Jr.
Director
Office of Noise Abatement
and Control
Environmental Protection Agency
Washington, D. C. 20460

Dear Dr. Meyer:

This is in reply to your request of July 30, 1971, for information on HUD's Noise Control and Abatement activities.

The involvement of HUD in the noise control and abatement areas stems largely from its support of the national goal of "a decent home in a suitable environment for every American family." This goal appeared first in the National Housing Act of 1949. It has been reaffirmed in the interim years and reinforced by the Department of Housing and Urban Development Act of 1965 and the National Environmental Policy Act of 1969.

Pursuant to this goal, HUD has been interested in noise policy and standards regarding:

1. site selection for the housing HUD insures or subsidizes;
2. structural characteristics and components of housing HUD insures or subsidizes;
3. land use planning; and
4. other forms of assistance that support the concept of a decent home in a suitable environment.

Noise control and abatement is not a separate and distinct program within HUD but rather, an ingredient in the environmental considerations of all HUD programs and activities.

In this context, HUD has recently consolidated, simplified and extended various noise control requirements relating to the several HUD programs into a single Department-wide Circular 1390.2, published August 4, 1971. We attach a copy. Prior to publication, this circular was reviewed by the Environmental Protection Agency, the Department of Health, Education and Welfare and numerous other Federal, State, and local groups and private citizens. Although HUD's interim standards have been found appropriate by reviewers, the Department plans to consider revision after a reasonable period of experience. The Department also has a continuing research activity in this area.

In order for the HUD Circular to be fully effective, it is necessary that builders and the State and local comprehensive planning agencies have knowledge of the HUD noise control policies and standards -- we are providing a direct mail out to planning agencies on this -- and also that they have a convenient way of getting reliable, objective calculations of noise levels around airports, major highways, and other sources of high noise.

Although we had earlier hoped that the Department of Transportation would provide Noise Exposure Forecasts to HUD as well as to the comprehensive planning agencies across the Nation free of charge, it now appears to DOT that the calculations can be provided to planning agencies only on a "cost reimbursement basis." Although we understand DOT's views, the result is to limit severely the role and initiatives of the local planning agencies in assessing and controlling noise and in improved land use planning as regards noise.

Accordingly, we believe it highly desirable for EPA to consider providing Noise Exposure Forecasts and other noise control data as part of its coordinative role in protecting the noise environment.

Sincerely yours,

Charles J. Orlebeke
Deputy Under Secretary

Enclosures

FEDERAL NOISE PROGRAM INFORMATION

I. Organizational

Department of Housing and Urban Development (see cover letter)

II. Functional

A. Objectives (see cover letter)

B. Specific Research

1. On-Going Projects

a. Technical Background for Noise Abatement in HUD Operating Programs

(1) Description and Objectives:

This project provides the technical support to assist in implementation of the Departmental Circular 1390.2.

(2) Products Include:

(a) Site assessment techniques that do not require the use of acoustical measurement instrumentation for preliminary screening of applications to determine suitability of the site with regard to noise exposure.

(b) Interim procedures for the measurement of noise exposure at proposed housing sites.

(c) A technical support document for use as a reference by field personnel.

(d) Training materials, including a demonstration tape recording.

b. Development of Comprehensive Urban Noise Survey Methodology

(1) Description

This is the initial phase of a cost-shared research project with the City of New York which is designed to assist the

Department with obtaining factual information that may be used in the conduct of its programs in a large city as well as to provide New York City with tools whereby it can deal with its urban problems.

(2) Objectives

The objective of this first phase is to develop a statistically valid methodology for objectively obtaining information by which to characterize the baseline noise climate of the City of New York.

c. Metropolitan Aircraft Noise Abatement Policy Studies

J.F. Kennedy International Airport, New York, N.Y.
Tri-State Transportation Commission;
O'Hare International Airport, Chicago, Illinois,
Northeastern Illinois Planning Commission;
Bradley International Airport, Windsor Locks, Connecticut,
Capitol Region Planning Agency;
Cape Kennedy Regional Airport, Melbourne, Florida,
East Central Florida Regional Planning Commission

(1) Description

These four studies, funded jointly by HUD and the Department of Transportation, are currently in their final stages of completion. Each of the four planning agencies examined the problem of aircraft noise in the communities located near its airport. Various land-use-related measures were evaluated for their potential for alleviating existing problems and preventing future problems from arising in the environs of the study airports.

(2) Objectives

The objectives are to provide in-depth case studies of the airport noise/community conflicts in specific airport areas to represent a range of potential noise alleviation strategies.

d. Summary of MANAPS and Development of a Planning Guidelines Manual

(1) Description

This is presently being negotiated as a follow-up study to the four original MANAPS. It will summarize the findings of the MANAPS and other similar studies, and evaluate each of the remedial and preventive measures for broader application over the nation. This, along with a discussion of the compatibility of different land uses to various levels of noise exposure, will be included in a planning guidelines manual to be used by planning officials.

(2) Objectives

The follow-up study is intended to make the information gathered by the MANAPS more useful to local officials concerned with airport noise. It is also intended to incorporate the knowledge gained in other studies into the MANAPS.

2. Projects About to be Contracted for or Under Active Consideration for F.Y. 1972

a. HUD Community Noise Handbook

(1) Description

A practical reference handbook for use by HUD personnel, planners, civic officials, developers and builders.

(2) Objectives

The objective is to provide a practical handbook that will be useful to the non-specialist. It will deal with feasibility of alleviating existing problems and guide planning to avoid creation of future noise problems.

b. Comprehensive Urban Noise Survey

(1) Description and Objectives

Upon satisfactory completion of Phase I development of the methodology, Phase II will assist New York City in conducting the comprehensive survey to document the baseline noise climate as well as to provide the HUD Regional Office with detailed objectives information of the City of New York.

c. Urban Noise Survey Methodology for Intermediate-Size City

(1) Description and Objectives

The purpose of this study is to review and evaluate the methodology developed for use in New York City to determine its applicability to much smaller cities. Necessary revisions will be made and tested in an actual noise survey.

d. Development of Noise Exposure Measurement Instrumentation

(1) Description and Objectives

The purpose of this project is to modify existing or develop new instruments suitable for easy use in determining site noise exposure pursuant to the interim standards of HUD Policy Circular 1390.2.

e. Engineering Guidelines for "Suitable Noise Control Feasures"

(1) Description

In some instances, mitigating circumstances may cause the Regional Administrator to make exceptions for sites that would be found "normally unacceptable." In those cases, noise control features must be included in the site design and building construction.

(2) Objectives

The objective is to provide HUD field personnel with technical guidelines for techniques of minimizing adverse impact of environmental noise on sites proposed for participation in HUD programs.

f. Evaluation of Site Noise Exposure Assessment Techniques

(1) Description and Objectives

The objectives are to evaluate, improve and augment the non-instrumental techniques for screening proposed housing sites with respect to their noise exposure.

g. Development of Model Ordinances and Building Code Sections

(1) Description and Objectives

[illegible] for [illegible]

(a) One purpose is to develop model ordinances, zoning and others for noise abatement and control that would avoid incompatible land use with respect to noise.

(b) Another purpose is to develop building code sections that would be used as models for specifying the performance of buildings in providing acoustical privacy.

h. Noise Emission Ratings for Appliances and Equipment

(1) Description and Objectives

The purposes of this study are (a) to foster the creation of a national mechanism to provide noise emission ratings for kitchen appliances and other equipment for single- and multifamily structures, and (b) to develop HUD noise emission standards for approving the use of such appliances and equipment in HUD-insured and HUD-assisted housing.

C. Procedures (refer to HUD Circular 1390.2)

1. Problem areas and research needs are identified by field personnel who implement the Departmental programs and HUD Circular 1390.2. Research priorities are assigned fundamentally on the basis of incidence of problem, need and overall benefit to the community.
2. Specific actions to abate and control noise mainly deal with efforts to avoid exposure of new residential areas and to provide a suitable auditory environment both outside and within residential buildings.
3. Procedures for coordination with other Federal agencies include participation in the Interagency Aircraft Noise Abatement Program, where HUD chairs the Land Use/Airports Panel and the Structures Panel.

Coordination and cooperation with other agencies on research efforts is accomplished through direct communication between principals responsible for research in the respective agencies. Further coordination is provided through development and review of environmental impact pursuant to Section 102(2)(c) of P.L. 91-190, National Environmental Policy Act of 1969.

4. In-house technical capability consists of several professionals in acoustics in HUD's research office and planning in HUD's Office of Community Planning and Management. Consultants are used by Central and field offices as required.

5. Proposed new efforts to upgrade noise abatement and control includes a training session for all HUD personnel responsible for environmental matters. The training program will assist in the implementation of the Departmental policy 1390.2 by including instruction in the use of site assessment procedures as well as in fundamental noise measurement instruments and procedures.

D. Future Program Proposals and Objectives

Future program proposals include development of better methodologies and techniques for determining community response to noise; improved performance of structures; significant investigations of air rights structures; economic and social aspects of noise abatement and control related to HUD operating programs.

U. S. DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT

TRANSMITTAL NOTICE

1390.2

8/4/71

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1. This Notice transmits the following:
Departmental Circular 1390.2, Noise Abatement and Control: Departmental Policy, Implementation Responsibilities, and Standards.

2. Explanation of Material Transmitted:
This Circular establishes noise exposure policies and standards to be observed in the approval or disapproval of all HUD projects. This Circular supersedes those portions of existing program regulations and guidance documents which have less demanding noise exposure requirements. The Circular (see paragraph 3) calls for prompt administrative actions both by Assistant Secretaries to incorporate new noise policies and standards in their program regulations and other central office instructions, and by Regional Administrators to identify existing problem cases.

3. Filing Instructions:
Insert:
1390.2

UDE:DISTRIBUTION: W-1, W-2, W-3, W-4
R-1, R-2, R-3, R-4, R-5

U.S. DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT

CIRCULAR

1390.2

8/4/71

SUBJECT: Noise Abatement and Control: Departmental Policy, Implementation Responsibilities, and Standards

1. PURPOSE AND AUTHORITY. It is the finding of the Department of Housing and Urban Development (HUD) that noise is a major source of environmental pollution which represents a threat to the serenity and quality of life in population centers. Noise exposure may be a cause of adverse physiological or psychological effects as well as economic losses. Accordingly, it is the purpose of Departmental policy to call attention to this threat, to encourage the control of noise at its source in cooperation with other Federal departments and agencies, to encourage land utilization patterns for housing and other municipal needs that will separate uncontrollable noise sources from residential and other noise-sensitive areas, and to prohibit HUD support to new construction on sites having unacceptable noise exposures.

   This circular thus provides policy to guide the exercise of discretion afforded in legislation on the various HUD programs. The circular is based on authority provided in:

   a. The Department of Housing and Urban Development Act of 1965 (PL 89-174) which provides that the Secretary may make such rules and regulations as may be necessary to carry out his functions, powers, and duties, and sets forth, as a matter of national purpose, the sound development of the Nation's communities and metropolitan areas; and

   b. The National Environmental Policy Act of 1969 (PL 91-190) which directs Federal Agencies to develop procedures to carry out the purposes of this Act.

2. POLICY

   a. Foster Standards and Consumer Protection. It is HUD's general policy to foster the creation of controls and standards for community noise abatement and control by general purpose agencies of State and local governments, and to support these activities by minimum national standards by which to protect citizens against the encroachment of noise into their communities and places of residence.

(1) Planning assistance. HUD requires that noise exposures and sources of noise be given adequate consideration as an integral part of urban environments in connection with all HUD programs which provide financial support to planning. This consideration shall be of a form that provides assurance that new housing and other noise sensitive accommodations will not be planned for areas whose current or projected noise exposures exceed the standards cited herein. In this regard, HUD places particular emphasis on the importance of compatible land use planning in relation to airports, other general modes of transportation, and other sources of high noise, and supports the use of planning funds to explore ways of reducing environmental noise to acceptable exposures by use of appropriate methods. Reconnaissance studies, and, where justifiable, studies in depth for noise control and abatement will be considered allowable costs.

(2) New construction. HUD discourages the construction of new dwelling units on sites which have, or are projected to have, unacceptable noise exposures*, by withholding all forms of HUD's assistance for such dwelling units. This policy applies also to college housing, group practice facilities, non-profit hospitals and nursing homes. (*See paragraph 4, Standards).

(3) Existing construction (including Rehabilitation). HUD considers environmental noise exposure an important factor in determining the amounts of insurance and other assistance. Within cost restrictions, including those set by market forces, HUD encourages modernization efforts for buildings in noisy environments when such efforts improve the noise exposure environments without substantially increasing the life of the structure. When modernization or rehabilitation would substantially increase the life expectancy of the structures, it is HUD's policy to apply noise exposure standards closer to those applicable to new construction.

(4) Grants and allowances. HUD extends such assistance to State and local governments for the alleviation of community noise as may be provided for by the Congress and as appropriate.

(5) Information and guidance (Research and publication). HUD maintains a continuing program designed to provide new knowledge of noise abatement and control to public and private bodies, to develop improved methods for anticipating the encroachment of higher noise exposures and to deal with this encroachment and to foster better understanding of the consequences of noise. Dissemination will be made through appropriate channels.

(6) Construction equipment, building equipment and appliances. HUD encourages the use of quieter construction equipment and methods in population centers, the use of quieter equipment and appliances in buildings and the use of appropriate noise abatement techniques in the design of residential structures and other structures with potential noise problems. In appropriate circumstances, HUD will allow certain additional costs for quieter construction equipment.

(7) Acoustical privacy in multifamily dwellings. HUD encourages the use of building design and acoustical treatment to afford acoustical privacy in multifamily dwellings.

(8) Advice and cooperation. HUD welcomes advice and counsel on improved methods for dealing with the noise problem, and encourages cooperation with other units of government as well as with appropriate private and voluntary organizations.

b. Promulgate Minimum Standards. It is HUD's further general policy to promulgate minimum standards and guidelines with respect to noise abatement and control, to utilize such standards and guidelines as a uniform national policy to guide HUD program decisions, and to support appropriate existing policies and standards of State and local governments designed for noise control and abatement. In this regard, noise exposures will be divided into three groupings (to be defined in "Standards"):

(1) acceptable

(2) discretionary
--normally acceptable
--normally unacceptable

(3) unacceptable

3. IMPLEMENTATION RESPONSIBILITIES

a. Assistant Secretaries. Each Assistant Secretary shall promptly incorporate by reference the Departmental noise abatement and control policy, standards and guidelines into appropriate regulations, guidance documents, and administrative forms and procedures for programs under his jurisdiction, including guidance for A-95 notification and review. Further, each Assistant Secretary shall evaluate the effects of, and compliance with, Departmental policy, and identify program areas under his jurisdiction in which additional noise control and abatement standards or guidelines are needed.

b. Regional Administrators and Area and Insuring Office Directors

(1) One-time Report of Existing Problem Cases. Using this policy statement as a common interpretation of existing HUD program policies, each Regional Administrator based on surveys by Area and Insuring Office Directors, shall identify active and pending applications in his region which are problem cases. Any cases for which the Regional Administrator intends to seek an exception action by the Secretary should be forwarded to the Deputy Under Secretary, along with a draft Environmental Statement. This should be accomplished within 90 days of the effective date of this policy.

(2) General Policy Implementation. Regional Administrators and Area and Insuring Office Directors shall assure that this policy and the prevailing standards and guidelines are implemented in relation to all decisions and recommendations taken in their jurisdiction, effective from the date of this policy, and that specialized noise abatement and control policies now associated with individual HUD programs are conscientiously enforced.

(a) Exceptions to this policy, e.g., the approval of actions in the range of unacceptable noise exposures, are strongly discouraged. Any exception to approve sites with unacceptable noise exposures must be accompanied by a Section 102(2)C Environmental Statement (see para 3c below), and must be concurred in by the Secretary with the advice of the appropriate Assistant Secretary. Such matters should be referred to HUD Headquarters in the earliest possible stage in the decision process. After common interpretation has been established, the possibility of further delegation will be reviewed.

(b) Authority to Approve New Sites. Administratively, decisions with respect to proposed housing sites with clearly acceptable noise exposures should be delegated to the lowest possible levels within field offices. Certain positive decisions to go ahead with sites with intermediate noise exposures are to be concurred in by the Regional Administrator (see para. 4b(1). The Regional Administrator shall use his discretion, and if he is of the opinion that an important precedent or issue of national significance is involved, he shall refer the case, with recommendations, to the Secretary prior to decision. (See also paras. 3c and 4c).

(c) Surveillance of Noise Problem Areas. Regional Administrators, Area and Insuring Office Directors and all field personnel, as appropriate, shall maintain surveillance on possible noise problem areas and advise local officials and planning groups of the unacceptability of sites for noise reasons at the earliest possible time in the decision process. Subsequent to the cleanup of backlog pursuant to paragraph 3b(1) above, it is not anticipated that there will be a need to make exceptions to this policy on the basis that the unacceptable sites have been "in planning" for numerous years.

(d) Assessments and Projections of Sound Exposures. In order to assure adherence to the guidelines and standards, it is the further responsibility of each Regional Administrator to require by appropriate means assessment or authoritative measurement and projections of sound exposures for at least five years (and longer if, there is a factual basis), with respect to applications and projects under review. Recommended measurement and procedures will be provided in the issuance of each new standard or guideline.

(e) Notice to applicants. At the earliest possible stage, HUD program administrators shall determine the suitability of the acoustic environment of proposed projects, and shall notify the applicant, existing or prospective, of any adverse or questionable situations.

(f) Interdepartmental Coordination. Regional Administrators shall foster appropriate coordination with other departments and agencies in the field, particularly the Environmental Protection Administration, the Department of Transportation, military base commanders and the Veterans Administration. The field offices of the Department of Transportation should be consulted for data on existing and projected noise in the vicinity of transportation media, including airports.

c. Environmental Statements. Detailed Environmental Statements, as defined by Section 102(2)C of PL 91-190 and implementing guidelines of the Council on Environmental Quality and this Department, shall be prepared to accompany any request for an exception to this policy circular and its standards and to accompany requests to approve those cases which fall into discretionary noise exposures which are "normally unacceptable." Final Environmental Statements shall be filed with the Council on Environmental Quality 30 days prior to making decisions on the exceptional cases.

d. Office of the Secretary. The Deputy Under Secretary in the Office of the Secretary shall review and coordinate the efforts under Assistant Secretaries, and provide Departmental Evaluation of compliance with this policy.

4. STANDARDS.

a. Standards, incorporating both technical and policy considerations, will be promulgated on the basis of review of the nature of problem cases identified in the regions pursuant to paragraph 3b(1) above, and advice from consultants, R&D contracts as appropriate and further study by the Departmental Working Group on Noise. Technical noise assessment manuals may be issued by HUD to provide further guidance on noise assessment and measurement to facilitate implementation of this circular.

b. Interim Standards. The following interim standards are established. In applying these interim standards, projected noise exposures shall form the basis for decision. (See Appendix 1 for explanations of terms, definitions, and for background discussion.)

(1) External Noise Exposures: Sites for New Residential Construction (single or multifamily)

(See Chart, External Noise Exposure Standards for New Construction Sites, on following page)

CHART: EXTERNAL NOISE EXPOSURE STANDARDS FOR NEW CONSTRUCTION SITES (Measurements and projections of noise exposures are to be made at appropriate heights above site boundaries)

GENERAL EXTERNAL EXPOSURES dB(A)	AIRPORT ENVIRONS	
	CNR ZONE */	NEF ZONE */
UNACCEPTABLE		
Exceeds 80 dB(A) 60 minutes per 24 hours Exceeds 75 dB(A) 8 hours per 24 hours	3	C
(Exceptions are strongly discouraged and require a 102(2)C environmental statement and the Secretary's approval)		
DISCRETIONARY -- NORMALLY UNACCEPTABLE		
Exceeds 65 dB(A) 8 hours per 24 hours Loud repetitive sounds on site	2	B
(Approvals require noise attenuation measures, the Regional Administrator's concurrence and a 102(2)C environmental statement)		
DISCRETIONARY -- NORMALLY ACCEPTABLE		
Does not exceed 65 dB(A) more than 8 hours per 24 hours		
ACCEPTABLE		
Does not exceed 45 dB(A) more than 30 minutes per 24 hours	1	A

*/ See Appendix 1 for explanations of Composite Noise Rating (CNR) and Noise Exposure Forecast (NEF).

(2) Interior Noise Exposures (for new and rehabilitated residential construction).

(Note: the standards listed below are performance standards. The means required for achieving them will depend on, among other things, the external noise levels, the equipment and layout used in the building, and the noise attentuation characteristics of the building's floors and walls. These standards assume open windows unless other provision is made for adequate ventilation.)

(a) "Acceptable":

Sleeping Quarters. For the present time, HUD field personnel should consider existing and projected noise exposure for sleeping quarters "acceptable" if interior noise levels resulting from exterior noise sources and interior building sources such as heating, plumbing, and air conditioning

--do not exceed 55dB(A) for more than an accumulation of 60 minutes in any 24-hour period, and

--do not exceed 45dB(A) for more than 30 minutes during night time sleeping hours from 11 p.m. to 7 a.m., and

--do not exceed 45dB(A) for more than an accumulation of eight hours in any 24-hour day.

Other Interior Areas. HUD personnel should exercise discretion and judgement as to interior areas other than those used for sleeping. Consideration should be given to the characteristics of the noise, the duration, time of day, and planned use of the area.

(3) Insulation Between Dwelling Units

(a) "Unacceptable"

For multifamily structures, including attached single family units, floors and dividing walls between dwelling units having Sound Transmission Class (STC) of less than 45 are always unacceptable.

(4) Other land uses and existing housing. Until HUD establishes a broader range of noise exposure standards, HUD administration at all levels shall take noise into consideration in the development of policies and guidelines and in the review and decisions on specific projects. Wherever feasible, standards along the lines of the above shall be employed in a manner consistent with proposed uses, densities and construction types.

c. Philosophy in Application of Standards. HUD personnel in the exercise of discretion should be guided by a desire to prevent noise problems from coming into being and by an overall philosophy of encouraging the control of noise at its source. Particular attention should be paid to fostering land utilization patterns for housing and other municipal needs that will separate uncontrollable noise sources from residential and other noise-sensitive areas. HUD personnel should encourage use of the A-95 notification and review processes to detect potential noise problems as early as possible.

Richard C. Van Dusen
Acting Secretary

APPENDIX 1. EXPLANATION OF TERMS, DEFINITIONS AND ADDITIONAL BACKGROUND

1. Measurement and Noise Assessment Procedures. Technical definitions of acoustical terminology shall be those contained in the related current documents of the American National Standards Institute (ANSI) and the American Society for Testing and Materials (ASTM). There has been a proliferation of concepts and mathematical techniques relating to sound and human response to sound. Fundamental to most all noise assessment procedures are the physical measurement of sound pressure and the concept of a level expressed in decibels. (See Appendix 2.)

   a. Sound Pressure Level Expressed in Decibels. Noise ("unwanted sound") affects the human ear through physical changes in sound pressure superimposed on the static atmospheric pressure in the presence of sound. Sound pressure has units of force per unit area.

   When a sound level meter is used, Sound Pressure Level can be determined and expressed in decibels, dB. In this case, the decibel is a logarithmic value which is referenced to the faintest sound pressure detectable by the human ear. Those requiring a more precise definition or understanding of these terms are referred to the forthcoming HUD noise assessment manuals for further discussion.

   In this circular, the decibel values, dB(A), are for those sound levels measured using the A-weighting network of a standardized sound level meter. The A-weighting network most closely approximates the response of the human ear to noise.

   Relatively inexpensive and portable metering equipment is available for purchase or, in some cases, rental. Some of the portable metering equipment also permits the accumulation of time for which the noise level at the site exceeds a given decibel setting. Sound level meters shall conform to the specifications set forth in the appropriate documents of the American National Standards Institute.

   The sound level meter is useful for measuring steady state or persistent noise and for identifying maximum sounds of intermittent noise. The A-weighted sound level, dB(A), has also been used as a first approximation in characterizing transportion noise. More sophisiticated evaluations of aircraft noise include some modifications which consider additional factors and are expressed as perceived noise in decibels such as PNdB or EPNdB. These refinements are discussed at greater length in the HUD noise assessment manuals.

b. Noise Exposure. "Noise exposure" as used in this circular is generally a combination of a noise level in decibels and a time duration for that noise level. For example, sites where existing and prolonged noise exposures do not exceed 45 dB(A) for more than 30 minutes in any 24-hour period are acceptable.

c. Composite Noise Rating (CNR). The CNR is a calculated rating for aircraft noise based on maximum sound pressure levels during a flyover, frequency of occurrence, time of day and other variables. It has been adopted by the Federal Aviation Administration (FAA) to describe the noise produced by aircraft operations in the vicinity of airports. In FAA usage, the CNR takes into account the magnitude of the sounds of individual aircraft types, the number of operations of each type on each runway, and the time of day. The numerical value of CNR is related to an expected range of community response.

The FAA has calculated CNR's for a number of domestic airports, and has divided CNR's into three zones -- corresponding to our acceptable discretionary, and unacceptable, respectively -- according to the expected community response, as shown in the following chart:

Chart for Estimating Response of Residential Communities from Composite Noise Rating.

Composite Noise Rating		*Zone*	*Description of Expected Response*
Takeoffs and Landings	*Runups*		
Less than 100	Less than 80	1	Essentially no complaints would be expected. The noise may, however, interfere occasionally with certain activities of the residents.
100 to 115	80 to 95	2	Individuals may complain, perhaps vigorously. Concerted group action is possible.
Greater than 115	Greater than 95	3	Individual reactions would likely include repeated, vigorous complaints. Concerted group action might be expected.

When advice and guidance are required in the analysis of property sites in the vicinity of military airports, the request for existing data and projections should be made initially to the Commander of the military base and subsequently to his designee.

Definition and Calculation of Noise Exposure Forecasts (NEF) or Composite Noise Ratings (CNR) shall be in accordance with the current DOT-FAA practices.

d. Noise Exposure Forecasts (NEF). The NEF is a calculated environmental rating which refines and replaces the CNR calculations for aircraft by including corrections for the presence of pure tone and duration of peak levels within the composite of intermittent noise. As currently used, it has validity only for airports.

The Department of Transportation (DOT) is converting from CNR to Noise Exposure Forecasts (NEF's). DOT has a contract for the calculation of NEF's at some 29 commercial and general aviation airports, and will soon have an intramural capability for producing NEF's for any civil aviation airport. The new NEF ratings for areas around commercial airports should be sought through FAA Airport Regional Offices.*/

The following categories correspond roughly to the categories of community response calculated originally for CNR's (see above).

Noise Exposure Forecasts

Category	Rating	Disposition in HUD
A	less than 30	Acceptable
B	30 to 40	Discretionary
C	more than 40	Unacceptable

For data on anticipated noise levels in the vicinity of military airports, the request should be made initially to the Commander of the base and subsequently with his designee.

---

*/ Until December 31, 1971, interim requests for NEF's should be made directly to FAA's Office of Environmental Quality (Attention EQ-1, Washington, D. C. 20590. Requests should be limited to applicants' sites within about three miles of a runway during this period.

e. Sound Transmission Class (STC) is a single-number rating which provides an estimate of sound transmission loss performance of a wall or floor as related to airborne sound generated by a limited class of household sound sources. The higher the number the better the performance.

2. Concepts Relating to Adverse Consequences of Noise. Noise is objectionable for commonsense reasons because it destroys the serenity of one's environment. Beyond that there are a number of specific concepts or ideas relating to noise. Current research efforts are directed toward establishing firm findings about certain noise phenomena and their consequences.

a. General Hearing Loss or Damage. High intensity noises even of relatively short duration such as blasts or explosions are known to have destroyed or severely limited the hearing sense. Moreover, highly amplified rock-and-roll music, sports shooting, and other recreational uses might produce sound levels capable of producing hearing loss especially if exposures are prolonged or recurrent. Continuing exposures to levels exceeding 100dB(A) lead to temporary and, eventually, to permanent hearing loss.

b. Impaired Hearing for Speech Communication. Prolonged exposure to less intensive noise is known to impair hearing of speech communications. The following table shows the hearing impairment resulting from 8-hour exposures to industrial noise over a long period.

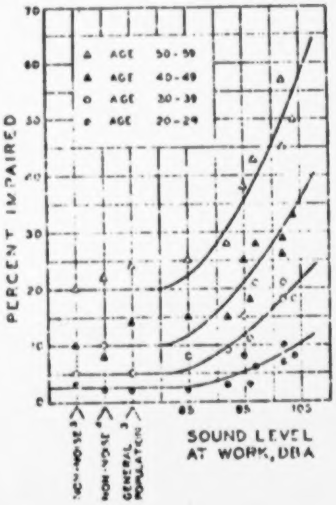


FIG. 1. Prevalence of impaired hearing in various populations. Each point indicates on the vertical scale the percentage of individuals having impaired hearing in a group exposed continuously at work to the *A*-weighted sound level indicated on the horizontal scale.

c. Speech Interference Levels. Background noise above certain levels interferes with one's ability to understand oral communication. The following figure illustrates some current knowledge of this phenomenon.

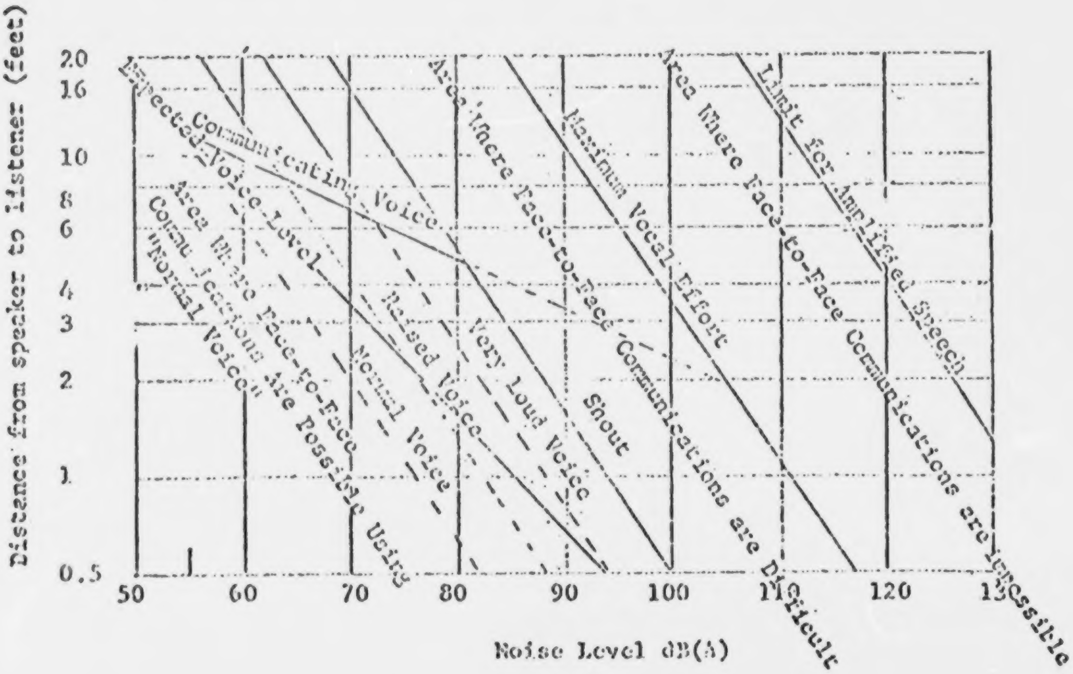


Figure 2 - Voice level and distance between talker and listener for satisfactory face-to-face speech communications as limited by ambient noise. Along the abscissa is the A-weighted sound level meter reading (dB(A)).

(SIL-Past, Present, and Future, J. C. Webster, Sound and Vibration, August, 1969)

d. Sleep Interference. Knowledge is less firm in this area and a series of qualifications is associated with many of the findings, including significant individual difference and becoming inured to certain noise levels (perhaps by hearing loss). Nevertheless, "sleep interference" would seem to have an important impact on the ability of the resident to achieve rest and enjoy his leisure, and hence must be considered.

e. Nervousness and Tension. There is a growing concern that exposure to the higher noise levels of the city might contribute to nervous disorders and tensions, but the findings are still inconclusive.

APPENDIX 2. SOUND LEVELS FOR COMMON NOISES
(Non-technical table for general perspective and background)

	dB(A)
JET PLANE, 100 FT. AWAY	130
PNEUMATIC RIVERTER	
ROCK MUSIC WITH AMPLIFIER	120
THRESHOLD OF FEELING PAIN	
THUNDER; DANGER OF PERMANENT HEARING LOSS	110
INTERNAL COMBUSTION AIRCRAFT ENGINE, 15 FT. AWAY	
BOILER SHOP; POWER MOWER	100
SUBWAY TRAIN PASSING STATION	
ORCHESTRAL CRESCENDO, 25 FT. AWAY; NOISY KITCHEN	90
CITY TRAFFIC (inside car); PNEUMATIC DRILL, 20 FT. AWAY	
PERSISTENT NOISE IMPAIRS HEARING FOR SPEECH COMMUNICATION (85 DECIBELS)	80
BUSY STREET	
INTERIOR OF DEPARTMENT STORE	70
AUTOMOBILE (AVERAGE) AT 35 to 40 M.P.H.	
ORDINARY CONVERSATION, 3 FT. AWAY	60
VACUUM CLEANER, 3 FT. AWAY	
QUIET AUTOMOBILE AT LOW SPEED	50
AVERAGE OFFICE	40
QUIET OFFICE	
CITY RESIDENCE	30
QUIET COUNTRY RESIDENCE	20
WHISPER, 5 FT. AWAY	
RUSTLE OF LEAVES	10
THRESHOLD OF HEARING	0

Sound levels can be measured with a mater and expressed in decibels. When used this way, the decibel is based on a comparison with the faintest sound that can be heard. The decibel scale is logarithmic; decibel levels cannot be added arithmetically. (See Appendix 1 and HUD noise assessment manuals for further discussion.)

DEPARTMENT OF LABOR

U.S. DEPARTMENT OF LABOR
Office of the Assistant Secretary for Administration
WASHINGTON, D.C. 20210

SEP 3 1971

Dr. Alvin F. Meyer, Jr.
Director
Office of Noise Abatement and Control
Environmental Portection Agency
1835 K Street, N. W.
Washington, D. C. 20006

Dear Dr. Meyer:

Your letter of July 30, 1971 to Mr. W. Scott Railton, requesting information regarding Department of Labor noise programs has been referred to me for reply.

The nature of the work performed by the Department does not, for the most part, result in objectionable noise, therefore, it has never had a noise control program. Noise control surveys have been conducted as part of regular safety inspections upon request of the Department safety officer. Rare noise complaints have been responded to with surveys, recommendations, and corrective action.

You have advised that we will be requested to conduct a survey to determine whether any of our activities are producing objectionable noise. Such a survey will be conducted upon receipt of the formal request and the survey guidelines.

Sincerely,

FRANK G. ZARB
Assistant Secretary
for Administration

U.S. DEPARTMENT OF LABOR
Occupational Safety and Health Administration
WASHINGTON, D.C. 20210

October 22, 1971

Mr. L. Justice
Office of Noise Abatement and Control
Environmental Protection Agency
Washington, D. C. 20460

Dear Mr. Justice:

In reply to your recent inquiries on noise control activities, we offer the following information about our compliance activities.

1. Our first noise Standard was published May 20, 1969 in the Federal Register. These were the Walsh-Healey Standards for Federal Supply Contracts over $10,000. Our standards covered many items of safety and health in addition to noise exposure.

2. On May 29, 1971, the U.S. Department of Labor's Occupational Safety and Health Administration published the Safety and Health Standards under the Williams-Steiger Occupational Safety and Health Act of 1970 (copy enclosed). These standards for noise are essentially the same as under the Walsh-Healey Standards of May 20, 1969.

3. I am enclosing a copy of our Bulletin 334 on "Guidelines to the Department of Labor's Occupational Noise Standards." It explains what we mean by "a continuing effective hearing conservation program."

4. We are working to get our field staff of compliance officers equipped to measure noise in workplaces. It is anticipated that we will have about 450 sound level meters in use early in 1972.

5. Our efforts on noise measurement and correction have been extensive since May 29, 1969. We have trained 70 of our key safety engineers and supervisors with the help of the Public Health Service and we plan to train others as time and facilities permit.

6. A number of firms have already been cited for violating our noise requirements. Much progress has been made in noisey plants throughout the country. The impact of our regulations has been felt far and wide as evidenced by the demand for speakers and by the fact that noise control and evaluation has been a favorite subject of many meetings and seminars.

Sincerely,

C. R. McClure

Charles R. McClure
Supervisory Industrial Hygienist
Office of Compliance Evaluation

Enclosures

Bulletin 334

(Revised 1971)

Guidelines To
The Department of Labor's
Occupational Noise Standards

U.S. DEPARTMENT OF LABOR
OCCUPATIONAL SAFETY
AND HEALTH ADMINISTRATION
WASHINGTON, D.C. 20210

200<

GUIDELINES TO
THE DEPARTMENT OF LABOR'S
OCCUPATIONAL NOISE STANDARDS

Introduction

Noise has long been recognized as a cause of occupational loss of hearing. Some companies have for many years taken steps to reduce noise levels and the exposure of their employees to them. In promulgating noise standards under the Walsh-Healey Public Contracts Act, the Department of Labor merely made mandatory minimum standards which have proved both practical and effective in preventing hearing loss in many plants.

Measurement, control, and protection against noise is a somewhat technical subject and one with which plant management, which is responsible for the enforcement of safety regulations, may not be familiar. Therefore, this paper:

> First, explains the terms used in section 50-204.10 and later in section 1910.95 of the Occupational Safety and Health Standards, as amended and first published in the Federal Register on May 20, 1969.
>
> Second, explains just what is expected of the employer in order to be in compliance with the requirements.
>
> Third, specifies certain instruments, equipment, and procedures which will be acceptable as a basis for judging compliance. These latter points are of particular interest to technical personnel, either at the plant or engaged on a consultative basis, to assist them in developing and carrying out the required controls and procedures.

This paper is equally applicable to employers currently covered by the McNamara-O'Hara Service Contract Act and by the Williams-Steiger Occupational Safety and Health Act of 1970.

Determining Sound Level Exposures, and Permissible Limits

Basically, section 50-204.10 and section 1910.95 set maximum permissible noise levels and exposures, and explain the types of corrective action which must be taken if these noise levels are exceeded.

Paragraph (a) of this section states:

> "(a) Protection against the effects of noise exposure shall be provided when the sound levels exceed those shown in Table I of this section when measured on the A scale of a standard sound level meter at slow response . . . ."

Loss of hearing occurs as a result of the cumulative effect of exposure to sound above a maximum intensity and over a maximum duration in a given period of time. For the purpose of this standard, the basic permissible intensity is 90 dBA for a duration of 8 hours out of a day. The amount of sound energy absorbed during such an exposure is considered to be the upper limit of a daily dose which will not produce disabling loss of hearing in more than 20 percent of the exposed population.

Table I indicates the duration of exposure to higher sound intensities which will result in no more damage to hearing than produced by 8 hours at 90 dBA. Employees must not be exposed to steady sound levels above 115 dBA, regardless of the duration.

TABLE I

PERMISSIBLE NOISE EXPOSURES 1/

Duration per day, hours	Sound level dBA slow
8	90
6	92
4	95
3	97
2	100
1½	102
1	105
½	110
¼ or less	115

1/ When the daily noise exposure is composed of two or more periods of noise exposure at different levels, their combined effect should be considered, rather than the individual effect of each. If the sum of the following fractions: C1/T1 + C2/T2. . .Cn/Tn exceeds unity, then, the mixed exposure should be considered to exceed the limit value. Cn indicates the total time of exposure at a specified noise level, and Tn indicates the total time of exposure permitted at that level.

The abbreviation dB in the right-hand column of the table stands for decibels, the unit of measurement of sound levels. The A scale is one of several on the sound level meter, a measuring instrument used to determine sound intensity. On this scale, the instrument reacts in much the same way as does the human ear in that it is much less responsive to low pitched tones than to those of higher pitch. The "slow" response is another setting of the instrument which causes it to average out high level noises of brief duration (such as hammering), rather than responding to the individual impact noises.

It is important to note that decibels are measured on a logarithmic rather than a linear scale. Every increase of 10 dB represents an increase of approximately 300 percent in sound pressure. A 100 dB noise is, therefore, 3 times as intense as a 90 dB noise, rather than about 10 percent more intense, as might be expected. Illustrated another way, if one machine produces a sound level of 90 dB, a second machine of the same kind placed next to it will result in a combined noise level of 93 dB, rather than 180 dB, which might be expected.

Exposures at Different Sound Levels

The footnote to Table I describes the method by which several separate exposures to different sound levels during a day are to be treated in determining whether or not the combined exposure is within permissible limits.

As an illustration, assume that an employee works most of the day in an area in which the sound level is 90 dBA, but for 15 minutes out of each of 7 hours, he is in an area of 100 dBA, and for one 15-minute period each day, he is in an area of 105 dBA.

This adds up to 6 hours at 90 dBA: permissible duration of exposure, 8 hours; 1-3/4 hours at 100 dBA: permissible exposure, 2 hours; and 1/4 hour at 105 dBA: permissible exposure, 1 hour. Tabulating it, we have:

	Actual Time	Permissible Time
dBA	C (hours)	T (hours)
90	6	8
100	1 3/4	2
105	1/4	1

Putting these values into an equation, we get:

$$\frac{6}{8} + \frac{1.75}{2} + \frac{0.25}{1} = \frac{6}{8} + \frac{7}{8} + \frac{2}{8} = \frac{15}{8} = 1.87$$

Since this total exceeds unity, the daily exposure is above the permissible limit, even though the total exposure at each sound level is below the permissible duration for that level.

No matter how briefly a person is exposed to higher sound pressure levels, if he spends the remainder of the day at a level of 90 dBA, his exposure will exceed the permissible limit. Only by being in an area having a sound level well below 90 dBA can his exposure to higher levels be compensated.

Assuming that the 6 hours are spent in areas of relatively low sound pressure levels, are the two exposures to higher levels permissible?

The equation becomes:

$\frac{1.75}{2} + \frac{0.25}{1} = \frac{1.75 + 0.50}{2} = \frac{2.25}{2}$ or 1.125. This is still greater than unity and, therefore, not permissible. Either the exposure to the 100 dBA level would have to be reduced to 1.5 hours or the exposure to the 105 dBA level to 0.125 hours or 7 1/2 minutes in order not to exceed the permissible total exposure.

$$\frac{1.5}{2} + \frac{0.25}{1} = \frac{2.0}{2} = 1 \text{ or } \frac{1.75}{2} + \frac{0.125}{1} = \frac{2.0}{2} = 1$$

Impulse or Impact Noise

The last sentence of sections 50-204.10 and 1910.95 states:

> "Exposure to impulsive or impact noise should not exceed
> 140 dB peak sound pressure level."

This sets the upper limit of sound level to which a person should be exposed, regardless of the brevity of the exposure.

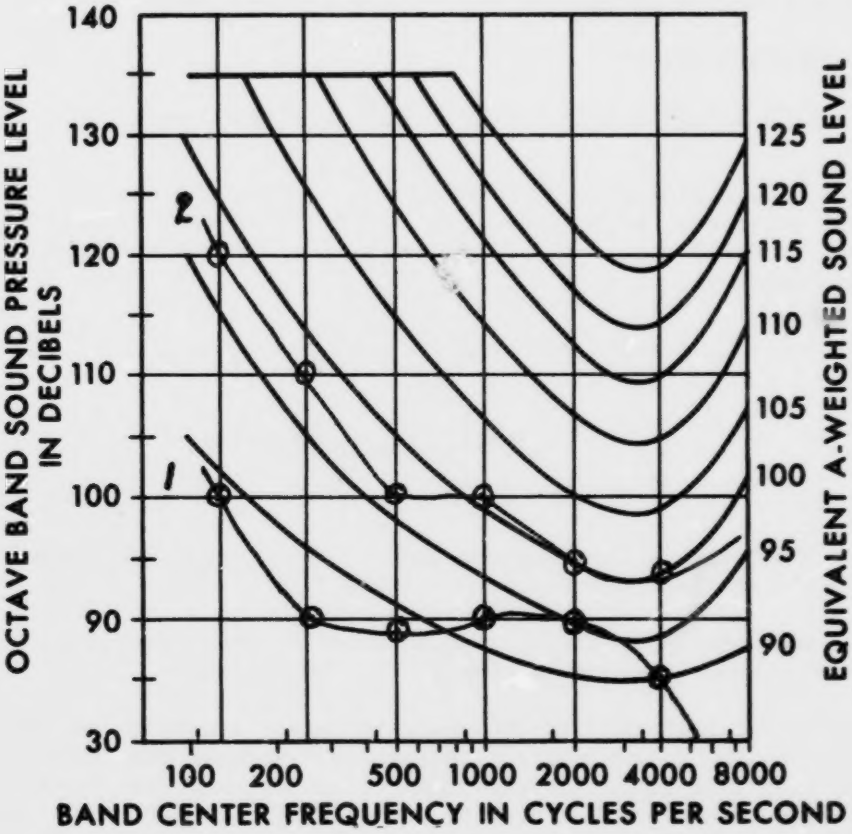
In contrast with the 115 dBA upper limit for steady noise, the higher intensity for impact noise is permissible because the noise impulse resulting from impacts, like hammer blows or explosive processes, is past before the ear has time to react fully. Impact noise levels are to be measured only with an impact meter or an oscilloscope.

Converting Octave Band Analyzer Readings

Many plants have done a great deal of noise control work based on measurements taken with the type of instrument that measures the sound level at each of a number of frequencies, or pitches, of the sounds produced rather than the overall total noise, as measured by the sound level meter. A chart is provided in the regulations to permit readings obtained from an octave band analyzer to be converted to corresponding values as indicated in Table I.

Sections 50-204.10 and 1910.95, paragraph (a), second sentence, state:

> When noise levels are determined by octave band analysis, the equivalent A-weighted sound level may be determined as follows:



Equivalent sound level contours. Octave band sound pressure levels may be converted to the equivalent A-weighted sound level by plotting them on this graph and noting the A-weighted sound level corresponding to the point of highest

> penetration into the sound level contours. This equivalent A-weighted sound level, which may differ from the actual A-weighted sound level of the noise, is used to determine exposure limits from Table I.

The above graph illustrates in a general way what was said previously about the response of a sound level meter working on the A scale. It minimizes, as does the ear, the low frequency sounds and emphasizes, as does the ear, the high frequency sound. Thus, a 90 dB reading on the A scale may include as high as 105 dB at 125 cycles per second, but would accept no more than 89 dB at 2,000 and 4,000 cycles per second.

To illustrate use of the graph in converting octave band readings into A-scale sound level meter readings, two sets of values of octave band readings have been plotted. The series numbered 1 shows readings at or below the 90 dBA curve, except at 2,000 cycles per second, where the reading falls on the 95 dBA curve. In this case, the sound level for use of Table I should be taken as 95 dBA. In the series marked 2, all the readings are below the 100 dBA curve, except at 1,000 cycles, where the reading is just on the curve. One hundred dBA would therefore be the value to be used in Table I.

As noted in the explanation of the graph, the actual sound levels measured with a sound level meter on the A scale may differ somewhat from the values determined by plotting the readings from an octave band analyzer on the graph. These differences, for most sounds, are of the same order of magnitude as the errors to be expected in the measurement and are not important. The intention was to provide a simple and relatively accurate means of conversion from one system of measurement to another to accommodate existing, effective plantwide programs.

Variable Noises

Sections 50-204.10 and 1910.95 state the final consideration in determining whether or not a permissible sound level is being exceeded:

> "If the variations in noise level involve maxima at intervals of 1 second or less, it is to be considered continuous."

This means that where the sound level meter on the A scale at slow response moves up from a generally steady reading, say from 88 to 92 dB, at intervals of one second or less, the high reading shall be taken as that to be used in Table I.

As a corollary to this, intermittent sounds of brief duration at intervals greater than one second should, as far as practical, be measured as to intensity and duration and the total duration over a day be ascertained. This total should be entered in the equation given in footnote 1/, Table I, to determine the permissible limit. These intermittent sounds, which can be measured with a sound level meter, should not be confused with impulse sounds of very short duration resulting from impacts or explosions.

Control Measures

Paragraph (b) of sections 50-204.10 and 1910.95 refer to control measures to be taken:

> "(b) When employees are subjected to sound exceeding those listed in the Table of Permissible Noise Exposures, feasible administrative or engineering controls shall be utilized . . . ."

The Department of Labor considers "feasible" to mean the following, as stated in the Oxford English and Merriam-Webster Dictionaries: "Capable of being done, accomplished or carried out; capable of being dealt with successfully."

Engineering Noise Control Measures

Engineering controls are those which reduce the sound intensity either at the source of the noise or in the hearing zone of the workers.

The following are examples:

A. Maintenance

    1. Replacement or adjustment of worn and loose or unbalanced parts of machines.
    2. Lubrication of machine parts and use of cutting oils.
    3. Properly shaped and sharpened cutting tools.

B. Substitution of Machines

    1. Larger, slower machines for smaller, faster ones.
    2. Step dies for single operation dies.
    3. Presses for hammers.
    4. Rotating shears for square shears.
    5. Hydraulic for mechanical presses.
    6. Belt drives for gears.

C. Substitution of Processes

    1. Compression for impact riveting.
    2. Welding for riveting.
    3. Hot for cold working.
    4. Pressing for rolling or forging.

D. Vibration Dampening

1. Increase mass.
2. Increase stiffness.
3. Use rubber or plastic bumpers or cushions.
4. Change size to change resonance frequency.

E. Reducing Sound Transmission Through Solids

1. Flexible mountings.
2. Flexible sections in pipe runs.
3. Flexible shaft couplings.
4. Fabric sections in ducts.
5. Resilient flooring.

F. Reducing Sound Produced by Fluid Flow

1. Intake and exhaust mufflers.
2. Fan blades designed to reduce turbulence.
3. Large, low speed fans for smaller, high speed fans.

G. Include Noise Level Specifications When Ordering New Equipment

H. Isolating Noise Sources

1. Completely enclose individual machines.
2. Use baffles.
3. Confine high noise machines to insulated room.

I. Isolating Operator

Provide a relatively sound-proof booth for the operator or attendant of one or more machines.

Controlling noise at the source, as illustrated by A through H1, is the ideal means of preventing noise induced hearing loss. The results are relatively long lasting; the operator of the individual machine is protected, as well as those employees at a distance from it, and there is no need for wearing protective equipment or following prescribed schedules of exposure. The measures listed under H2, H3, and I will, if effective, limit the number of persons exposed to high noise levels, but are unlikely to protect operators and those close to the noise sources.

A number of the listed controls can be accomplished quite inexpensively by plant personnel. Others require considerable expense and highly specialized technical knowledge to ensure the expected results. It is therefore strongly recommended that plants avail themselves of the services of competent acoustical engineers in planning and carrying out their noise control programs.

The Department of Labor expects employers to explore the possibility and practicability of controlling noise by engineering and to take all feasible measures before resorting to use of administrative controls or of personal protective equipment.

Administrative Controls

If noise cannot be reduced to permissible intensities through engineering controls, administrative controls should be developed in order to limit duration of workers' exposure to noise levels above 90 dBA to the times shown in the Table of Permissible Noise Exposures.

The following are examples:

1. Arrange work schedules so that employees working the major portion of a day at or very close to the 90 dBA limit are not exposed to higher noise levels.
2. Ensure that employees who have reached the upper limit of duration for a high noise level, in accordance with Table I, work the remainder of the day in an environment with a noise level well below 90 dBA.
3. Where the man-hours required for a job exceed the permissible time for one man in one day for the existing sound level, divide the work among two, three, or as many men as are needed, either successively or together, to keep individual noise exposure within permissible time limits.
4. If less than full-time production of a noisy machine is needed, arrange to run it a portion of each day, rather than all day for part of the week.
5. Perform occasional high level noise producing operations at night or at other times when a minimum number of employees will be exposed.

Measures such as these can often be instituted at little cost or effort, simply by introducing noise exposure as a factor in production planning. While not as satisfactory as controlling noise at its sources, administrative control measures are more easily enforced, than is the requirement to wear personal protective equipment. For this reason it is preferred.

Personal Protective Equipment

When engineering and administrative controls fail to bring noise levels or duration of exposure to them below permissible levels, the use of personal protective equipment is required, as stated in the second sentence of paragraph (b), sections 50-204.10 and 1910.95:

> "If such controls fail to reduce sound levels within the levels of the table, personal protective equipment shall be provided and used to reduce sound levels within the levels of the table."

The use of personal protective equipment is considered by the Department to be an interim measure while engineering and administrative controls are being perfected. There will be very few cases in which the use of this equipment will be acceptable as a permanent solution to noise problems.

Some methods of control, such as providing an isolation booth for operators, or conducting noisy operations when few employees are in the plant, may require use of personal protective equipment by the operator when he must emerge from his booth to make adjustments, or by those few employees who carry on the noisy operation.

In addition, the regulations require both provision and use of personal protective equipment. How the latter is accomplished is up to the employer. The Department recommends, however, that an educational and promotional program precede initiation of required use of such equipment, and continue as long as necessary to achieve 100-percent acceptance by employees. In the absence of an observable high proportion of use, the Department would consider the lack of a training and promotional program as constituting a violation of the regulation.

Selection of Personal Protective Equipment

Cotton stuffed in the ears has little value and will not be accepted by the Department, because of the relatively small attenuation (reduction of noise level) and the care which must be taken in using it.

Fine glass wool can be used instead of cotton, because the attenuation which can be achieved is very good. It is an acceptable protective device.

Wax impregnated cotton, when properly inserted in the ear, provides protection equivalent to that provided by plugs or muffs. If supervisors can assure that this material is properly used and fresh material is provided daily, then this type of ear protection would be acceptable.

Properly fitted earplugs are essentially equal in attenuating ability to ear muffs; either is acceptable to the Department. Plugs are inexpensive but must be fitted to the individual. In addition, plugs, and any other type of protector inserted into the ear, must be issued by a trained person under the direction of a physician or by the physician himself. Frequent checks must be made to see that the plugs are being properly inserted.

Ear muffs, though relatively expensive, may be issued by any designated person in the plant, as the only fitting required is adjustment of the head band. This makes it very easy for the supervisor to check on proper use of the muffs. Long hair and spectacle or goggle temples will interfere with the seal made by the cushioned edges of the muffs and will correspondingly reduce the actual attenuation, as stated by the manufacturer.

Regardless of the type of ear protector decided upon, its attenuation, as stated by the manufacturer, must be sufficient to reduce the noise level in the worker's ear to the level and for the duration prescribed in Table I. The manufacturer's stated values are determined under ideal conditions, and, therefore, as a precaution, it is wise to assume that the attenuation actually attained in use in the shop will be at least 5 dB less than the stated value. Only those ear protectors which have been tested in accordance with ANSI standard Z24.22-1957, "Method for Measurement of the Real-Ear Attenuation of Ear Protectors at Threshold," are acceptable to the Department.

The Department strongly recommends that any employee who is exposed to high sound levels and requests ear protection be provided with it, even if the duration of exposure is within the limits prescribed by Table I.

Hearing Conservation Program

Sections 50-204.10 and 1910.95 conclude:

> "In all cases where the sound levels exceed the values shown herein, a continuing, effective hearing conservation program shall be administered."

Therefore, where the sound level in a working area has not been reduced to 90 dBA or below by engineering means, and reliance must be placed on administrative controls to limit duration of exposure, or on ear protection to reduce the sound level actually reaching the ear, a hearing conservation program is required. The program will be applied to all those employees whose work brings them either steadily or infrequently into areas in which sound levels exceed 90 dBA.

Definitions

"Continuing" means that the program will be in effect and in use as long as noise levels above 90 dBA occur in the plant.

"Effective" means that exposed employees will not suffer continuing deterioration of hearing acuity because of their exposure, but that incipient loss of hearing will be detected and necessary steps taken to prevent further deterioration before serious hearing loss has occurred.

In a broad sense, "hearing conservation" covers the entire range of actions required by sections 50-204.10 and 1910.95. As used here, however, it refers to audiometry--periodic checks on the hearing ability of individual employees; and noise surveys--periodic checks of the noise level in the areas in which employees are working.

Audiometry

Audiometric tests will be made of all individuals working regularly or ~~in~~frequently in areas in which the noise level is above 90 dBA. The purpose of these tests is to assure that administrative controls in use or ear protection devices provided are being adhered to or properly used and are effective in preventing loss of hearing from the noise levels encountered.

Audiometric tests may be made as frequently as specified by the plant's regular or consulting physician, but only under very special conditions shall they be made less than once a year.

The tests may be made in a doctor's office or elsewhere outside the plant, providing the test facilities, techniques, and records are equal to or exceed the minimum requirements described below.

1. Test Facilities and Procedures

The test booth or room shall meet criteria of ANSI standard S3.1-1960 (or latest), "Standard for Background Noise in Audiometric Rooms" for testing to a minimum level of 10 dB on the ISO 1964 audiometric scale.

The booth or room may be either prefabricated or locally built. Doors, gaskets, and other parts of the room or booth which may deteriorate, warp, or crack shall be carefully inspected periodically and necessary repairs or replacements made at once to ensure that successive audiometric tests of each individual are directly comparable and will give a true evaluation of the individual's hearing ability.

The operator of the audiometer should be positioned outside the room or booth but able to see the interior through a window. The person being tested must face away from the operator and the audiometer to ensure that all his responses are based on sound signals alone.

The test shall consist of an air conduction octave band analysis, as described in ANSI standard S3.1, and shall include, at least, 500, 1,000, 2,000, and 4,000 Hz.

The audiometric tests shall be made by a person trained and skilled in audiometric testing.

2. Audiometers

The audiometer used to make these tests shall meet the specifications for limited range, pure tone audiometers in ANSI standard S3.6-1969, "Specifications for Audiometers."

The audiometer shall have a certificate of calibration before it is placed in use, and shall be recalibrated each year thereafter. This calibration shall check both frequency and intensity at each setting, rise time and overshoot, and electrical and mechanical integrity. A current certificate attesting to such calibration shall be readily available for inspection by the Department of Labor.

On the audiometer shall be a statement indicating whether it is calibrated to ASA 1951 values or to the current American National Standard, which is identical to the ISO 1964 standard.

The audiometer shall be subjected to a biological check, preferably once a week but at least once a month, or before each use of the instrument if it is used less than once a month. The check shall be made by testing a person with a known and stable audiometric curve. The monthly check should include movement and bending of cord, wire, and lead, knob turning, switch actuating, and button pushing to ensure that there are no sounds other than the test tones. A log of these checks shall be maintained and be available for inspection.

3. Records

In addition to the certificates and logs referred to in 2 above, a record of each audiogram made on each individual tested shall be available for inspection. Records of audiometric tests shall indicate whether readings are based on ASA 1951 or on American National Standard (ISO 1964). The complete records on each employee required to be tested shall be retained for 1 year following termination of employment or transfer to an area in which noise levels above 90 dBA do not exist.

The records will be examined for evidence of any deterioration of hearing acuity and of action taken to prevent further deterioration in those employees found to suffer some loss of acuity. Conclusions as to effectiveness of control measures taken will be based on examination of a significant number of audiograms and not upon the basis of one or two cases.

4. Audiometric Tests Outside of Plant

If audiometric tests are done outside the plant, the Department of Labor representative will also inspect the facilities and test records, as noted above, and the same standards will apply.

Plant management will make arrangements for such inspection with the person conducting the audiometric tests and may accompany the representative in his inspection and review of records.

Noise Surveys

A noise survey of each area in the plant in which sound levels exceed 90 dBA shall be made at least once each year to ensure that sound levels have not increased above those originally existing. The survey may also establish that noise levels in some areas have been reduced to levels below 90 dBA and thereby justify discontinuing application of requirements for administrative controls, ear protection, and audiometric tests of individuals in such areas.

A noise survey of an area is recommended whenever a change is made in either equipment or type of operations so that significant changes in noise level will be acted upon immediately.

Tests of noise levels will be made with a sound level meter on the A-scale, slow response. The use of octave band analyzers or impact meters for control or other purposes shall be in addition to, not in place of, tests made with the sound level meter.

The sound level meter used will be one meeting specifications in ANSI standard S1.4-1961, "General Purpose Sound Level Meters."

Records will be made of such surveys showing: the instrument used; date, time, and location of such tests; machinery or equipment generating the noise; and name of person making the test.

Test records shall be kept readily available for inspection for 1 year or until a subsequent survey is made, if done more frequently.

The noise survey will be made by an insurance carrier, a consultant, a representative of a State health or labor department, or by a qualified individual designated by the company.

Compliance Plan

Whenever a noise survey shows noise levels in excess of those listed in Table I, necessary steps to reduce the noise exposure to or below those levels shall be ascertained and a detailed plan, with completion dates for individual steps, shall be prepared.

Following the original survey which shows existence of overexposures, the steps in a typical compliance plan might include the following, not necessarily in this order and some usually going on simultaneously:

1. A detailed survey of sound levels and sound spectra to determine the sources of excessive sound levels.

2. Initiation of engineering studies to determine methods for reducing sound levels at their sources.

3. Planning and initiation of feasible administrative controls, such as modifying production schedules to divide noisy jobs among enough people to bring each below the permissible limit or spreading part-time noisy operations.

4. Initial audiograms for personnel excessively exposed.

5. Installation of a personal protective equipment program.

6. Followup audiograms at appropriate intervals to assess effectiveness of the personal protective equipment program and administrative controls.

7. Installation of engineering controls, or process changes to reduce noises at their source.

8. Repeated noise surveys to measure effectiveness of the engineering changes.

When the compliance plan involves long term engineering projects (for example, 1 or 2 years) it may be revised from time to time as conditions change. The orderly completion, on schedule, of the various phases of the compliance plan, together with other components of the hearing conservation program, will be considered compliance with the regulation.

Applicable ANSI standards are available from the American National Standards Institute, 1430 Broadway, New York, N.Y. 10018

S1.4-1961 -- Specification for General Purpose Sound Level Meters--$2.75
S1.6-1967 -- Preferred Frequencies and Band Numbers for Acoustical Measurements--$2.75
S3.1-1960 -- Criteria for Background Noise in Audiometer Rooms--$2.75
S3.6-1969 -- Specification for Audiometers--$4.50

June 8, 1971

★ U. S. GOVERNMENT PRINTING OFFICE : 1971 O - 484-762 (8)

DEPARTMENT OF TRANSPORTATION

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Dr. Alvin F. Meyer, Jr.
Director, Office of Noise Abatement
  and Control
Environmental Protection Agency
1835 K Street, N.W.
Washington, D.C. 20460

Dear Dr. Meyer:

This is in response to your letter of July 20, 1971, requesting information dealing with Federal activities in noise effects, abatement and control.

In your meeting of August 6 questions were asked concerning the specific format of information required for the preparation of a report pursuant to Title IV of the Clean Air Act of 1970. At that time you stated that your office would format information provided we could furnish it to permit an evaluation that you need.

The Department of Transportation's functions with respect to noise abatement programs stem from the Department of Transportation Act of 1966 (P.L. 89-670), Section 4, which states that the Department will promote and undertake research and development relating to transportation, including noise abatement, with particular attention to aircraft noise. In addition, P.L. 90-411 provides for noise certification of aircraft. Funding is supported by the Transportation Planning, Research and Development (TPR&D) Appropriation of the Department.

Copies of the Department's First and Second Federal Aircraft Noise Abatement Plan have been furnished Mr. Marrazzo. These documents outline our overall program objectives and list specific research efforts concerning aircraft noise reduction.

Pursuant to its transportation noise abatement research and development objectives, the department employs the in-house technical capabilities of the Transportation Systems Center (TSC) at Cambridge, Massachusetts, as well as the services of outside contractors. Attached is a listing of the contractual projects of this office, with copies of write-ups for each. (See Attachment #1) Also attached are copies of our FY-1971 and FY-1972 Transportation Noise Abatement Project Plan Agreement with the Transportation Systems Center, together with a copy of their June 1971 technical progress report. (See Attachment #2)

With respect [illegible] procedures used for coordination, we use the Interagency Airc[illegible]se Abatement Program (IANAP) structure with which you are familia[illegible]ddition, the Department and NASA have an agreement wherein all p[illegible]ed projects are reviewed prior to finalization. Within the Department we have a formal DOT Noise Abatement Committee which coordinates transportation noise abatement research and development activities across the board.

Extracts from the Department's FY-1972 Congressional Submission relating to transportation noise abatement are attached for your information. (See Attach[illegible] The fiscal information has been corrected to reflect our latest pla[illegible] level to support these efforts.

An additional attachment (#4) is furnished to provide information pertaining to the personnel assigned within our Department to discharge transportation noise abatement responsibilities.

Regulation and certification authority is reposed within the Department under the auspices of the FAA pursuant to Public Law 90-411. This provides for noise certification of aircraft pursuant to Federal Air Regulation Part 36.

We hope this information will prove useful to you in preparing your report. If you need further assistance, please advise.

Sincerely,

Original Signed by
Charles R. Foster

Charles R. Foster
Director
Office of Noise Abatement

Enclosures - 4

TST-52 MRankin:ekk 8-27-71 x. 64558
TST-50 reading
TST-50 subject
TST-1
M.Rankin

~~29 April 1970~~
Updated 11/3/70

DOT-OS-00002

Start Date: 19 12 69

Estimated Completion Date: 12 72 (3-yr. effort)

Kind of Report: New

Performing Organization, Name: Department of Aerospace Engineering
University of Southern California
University Park
Los Angeles,California 90007

Principal Investigator, Name: John Laufer, Professor and Chairman
Department of Aerospace Engineering

Responsible Government Organization, Name: Department of Transportation
Assistant Secretary
for Systems Development and Technology
Office of Noise Abatement
800 Independence Avenue, SW
Washington, D.C. 20590

Responsible Government Individual, Name: W. Harry Close
Research Division
Office of Noise Abatement

Key Words: Basic research on jet engine noise and its abatement

Title: Modeling for Jet Noise

Summary: Develop engineering guidelines for the noise abatement of subsonic and supersonic jets. The program of basic research will be conducted over a period of three years. The first year's activity will include: a) the overall design and construction of the research facility: the anechoic chamber, the air supply system for the jet, the jet nozzle, the traversing mechanisms used for detailed measurements; b) development of special narrow angle microphones of electronic system for data processing; and c) preliminary measurements in a high subsonic "clean jet". In the second year plans are laid out to conclude the "clean jet" experiments to initiate the theoretical study on a source model, as well as to start an experimental and analytical work on the effects of initial conditions. Depending on the progress of this program, it is hoped that in the third year research on the supersonic jet noise problem could be initiated.

Resources Estimate, Funds: $529,000 for 3-yr. effort. First year - $236,166.
Second year - $126,863

Security of Report: Unclassified

Procurement Method: Grant Agreement.

~~29 April 1970~~
~~Updated September 1970~~
Updated May 15, 1971

DOT-OS-00035, Task Order #3

Start Date: 28 01 70

Estimated Completion Date: 01 71

Kind of Report: New

Performing Organization, Name: National Academy of Sciences
National Research Council
Division of Engineering
Highway Research Board

Principal Investigator, Name: W. N. Carey, Jr.
Executive Director, Highway Research Board

Responsible Government Organization, Name: Department of Transportation
Assistant Secretary
for Systems Development & Technology
Office of Noise Abatement
800 Independence Avenue SW
Washington, D.C. 20590

Responsible Government Individual, Name: ~~John G. Gourlas~~ - W. Harry Close
Research Division
Office of Noise Abatement

Key Words: Advisory and information services for transportation noise

Title: NAS Services Trans Noise Abate

Summary: Provide four interrelated information services: 1) Advisory Services -- Information Storage, Retrieval and Synthesis: an Advisory Committee within the Highway Research Board of the National Research Council, National Academy of Sciences of approximately 8 experts in the various aspects of transportation noise will be appointed to advise on the scope, sources and input/output requirements of a storage and retrieval system for noise information and to advise on topics and procedures to be used in the synthesis of stored information and that which is available from other resources. Initial priority for committee concerns is in the area of surface transportation noise; 2) Storage and Retrieval System for Transportation Noise Research Information: develop a specialized file for transportation noise research information service (TNRIS). The service will provide for up to 2500 references in the first year operation to cover ongoing research activities, reports on completed research and publications or other documents within the scope of the service. Output from the system will include response to direct queries, monthly lists and indexes of stored material and, at the end of the contract year, an experimental publication to represent the year's accomplishments; 3) Synthesis of Information for Selected Topics on Transportation Noise Abatement: after an adequate information base has been acquired, a small number of relatively narrow topics within the field of transportation noise abatement will be selected as high-priority topics for information synthesis. One topic will then be selected for producing a corresponding information synthesis document; 4) Advisory Services - Research Programs: examine and make recommendations for research and development activities that may lead to the implementation, within the transportation community, of policies, standards and procedures for alleviating transportation noise.

Resources Estimate, Funds: $116,000

Security of Report: Unclassified

Procurement Method: Contract - Task Order

Amendment #2 to above provided $50,000 to continue the advisory and information services. for transportation noise abatement through August 21, 1971.

8 October 1970

DOT-AS-10004

Start Date: 27 08 70

Estimated Completion Date: 31 12 71

Kind of Report: New

Performing Organization, Name: U.S. Department of Commerce
National Bureau of Standards
Office of Vehicle Systems Research
Washington, D.C. 20234

Principal Investigator, Name:

Responsible Government Organization, Name: Department of Transportation
Asst. Secretary for Systems Development & Technology
Office of Noise Abatement, TST-50
Rm. 10409, 400 - 7th St., S.W.
Washington, D.C. 20591

Responsible Government Individual, Name: Close, W. Harry
Chief, Research Division
Office of Noise Abatement

Key Words: Identify and quantify the physical parameters which affect the noise generation characteristics of truck tires; develop an information base that may lead to standardized tire-noise testing procedures and to highway noise reduction criteria, standards, and regulations.

Title: Truck Tire Noise Investigation

Summary: This study will provide a scientific basis for designing quieter tires. Hopefully the information produced will prompt additional action by vehicle and tire manufacturers, truckers, highway designers and local law enforcement agencies to achieve a full measure of environmental quality improvement. A literature search will be performed for existing information as well as ongoing related work to determine the scope of the overall truck tire noise problem; visits and contacts will be made to trucking industry and tire and vehicle manufacturers to identify and define the truck tire population, practices of the fleet and individual users of trucks, and the basic differenc that exist among different users. An attempt will be made to identify the parameters that affect noise generation. Reassessment of the status of laboratory and roadside noise measurement development will be conducted. As a result of these efforts, certain tire types will be selected and tested on the road and in the laboratory. Upon completion of testing and the collection and reduction of data, an analysis will be conducted to determine significant findings of the truck tire noise investigation.

Source Estimate, Funds: Total funding estimate - $327,000. Initial funding of $4 for FY-70 was provided by FHWA in April 1970. Interagency Agreement DOT-AS-1C addresses the first increment of FY-71 required to continue work without interruption. Total FY-71 requirements are estimated at $200,000.

Security of Report: Unclassified

Procurement Method: Interagency Agreement

Other Funding Agencies: FHWA

19 February 1971

DOT-OS-10025

Start Date: 17 02 71

Estimated Completion Date: 01 06 71

Kind of Report: New

Performing Organization Name
Society of Automotive Engineers, Inc.
Two Pennsylvania Plaza
New York, N.Y. 10001

Principal Investigator, Name: Favata, Fred

Responsible Government Organization, Name:
Department of Transportation
Asst. Secretary for Systems Development and Technology
Office of Noise Abatement
400 Seventh Street, S.W.
Washington, D.C. 20590

Responsible Government Individual. Name:
Paullin. Robert L.
Chief, Regulatory Policy & Standards Div.
Office of Noise Abatement

Key Words: Analysis and report of the Plenary Session of the SAE Conference on Aircraft and the Environment

Title: Aircraft and the Environment

Summary: Analyze and report on the results of the Plenary Session of the SAE Conference on Aircraft and the Environment. The review and evaluation shall cover the following:

1) A delineation of the conclusions and recommendations of the nine workshop sessions, as modified (if any) by the Plenary Session.
2) A delineation of the pertinent discussions at the Plenary Session, with identification of appropriate groups or representatives of those groups.
3) A technical/engineering review of the conclusions and recommendations arising from the Plenary Session, with a ranking of such results as to viability, reasonableness and scheduling.

4) An evaluation of the feasibility of implementing the results of the Plenary Session, with particular emphasis on the following:

   a. The technical interation of air, noise, solid waste and fluid pollutants.
   b. The economic implications of the results.
   c. Suggested priorities from a materials and manpower standpoint.
   d. The effect on the air transportation system.

Resources Estimate, Funds: $8,855 (fixed price)

Security of report: Unclassified

Procurement method: Contract - fixed price.

28 May 1971

DOT-OS-10183

Start Date: 14 5 71

Estimated Completion Date: 14 7 71

Performing Organization, Name: B&K Instruments, Inc.
5111 West 164th Street
Cleveland, Ohio 44142

Principal Investigator, Name: E. John Wootten, Vice President
Systems and Engineering

Responsible Government Organization, Name: Dept. of Transportation
Asst. Secretary for Systems
Development and Technology
400 7th Street, S. W.
Washington, D.C. 20590

Responsible Government Individual, Name: Close, W. H.
Chief, Research Division
Office of Noise Abatement

Key Words: Sound level detection system; noise monitoring system.

Title: Field Noise Monitor System

Summary: Obtain sound level detection system for unattended monitoring of aircraft and ambient noise levels in airport environs.

Resources Estimate, Funds: $18,000. ($17,099 Actual)

Security of Report: Unclassified.

Procurement Method: Contract - fixed price

Other Funding Agencies: N/A

Final Product Due: July 14, 1971

14 May 1969

DOT-OS-A9-026

Start Date: 18 10 68

Estimated Completion Date: 07 69

Kind of Report: New

Performing Organization, Name: Southwest Research Institute (under contract
to Society of Automotive Engineers, Inc.)

Principal Investigator, Name: Walters, F. C., Chairman
SAE Research Project Committee

Responsible Government Organization, Name: Department of Transportation
Asst. Secretary for Research & Technolog
Office of Noise Abatement
800 Independence Avenue, S.W.
Washington, D.C. 20590

Responsible Government Individual, Name: Foster, Charles R.
Director, Office of Noise Abatement

Key Words: Urban noise levels; noise generating machines; operator tolerance.

Title: Support of Society of Automotive Engineers, Inc. Noise Research Study.

Summary: Obtain data which is correlatable to urban noise levels for use in transportation noise abatement research.

This program is to gather, catalog, analyze and summarize available noise data in 3 areas relative to noise associated with the operation of tractors and related equipment. Specifically, the 3 areas are:

(1) Definition of the physical characteristics of typical noises to which operators of such equipment might be exposed.
(2) The tolerance levels of such opefators, both with and without protection.
(3) Degree of possible hearing damage and operator disorientation from exposure to variable noise.

Resources Estimate, Funds: $5,000. ($4.290 Actual)

Security of Report: Unclassified.

Procurement Method: Contract - fixed price.

Other Funding Agencies: Industry - Farm & Industrial Equipment Institute;
Construction Industry Manufacturers Assn.;
Power Saw Manufacturers Association.

Final Report received December 1969.

~~14 May 1969~~
Updated 17 April 1970

DOT-OS-A9-009

Start Date: 23 08 68

Estimated Completion Date: 06 69

Kind of Report: New

Performing Organization, Name: Bolt Beranek & Newman
50 Moulton Street
Cambridge, Massachusetts 02138

Principal Investigator, Name: Franken, Peter A., Vice President
Physical Sciences Division

Responsible Government Organization, Name: Department of Transportation
Assistant Secretary for Research & Technology
Office of Noise Abatement
800 Independence Ave., S.W.
Washington, D.C. 20590

Responsible Government Individual, Name: Paullin, Robert L.
Chief, Regulatory Policy & Standards Div.
Office of Noise Abatement

Key Words: Metropolitan airports near-term noise abatement alternatives; operational and non-operational procedures; composite noise rating; aircraft noise exposure forecasts.

Title: Metropolitan Aircraft Noise Abatement Study (Logan International Airport)

Summary: Develop useful alternatives for achieving both preventive and remedial relief from aircraft noise exposure in the vicinity of a large metropolitan airport - Logan International Airport, Boston, Massachusetts. Included are considerations of: basic causes, growth trends, and social-economic impact of aircraft noise exposure on individuals and communities near airports. The project will include preparation of alternative approaches for use by local, state, and Federal governments to guide them in land use development, airport development and related aircraft operational procedures.

Develop a methodology for use by other airport and metropolitan planning officials.

Progress: ~~Revised draft report in review by Government~~. Final report rec'd 3/70.

Resources Estimate, Funds: $31,027 (Jointly funded: Department of Transportation/ Department of Housing and Urban Development)

Security of Report: Unclassified.

Procurement Method: Contract - fixed price

Other Funding Agencies: Department of Housing and Urban Development.

~~29 May 1969~~
Updated 31 Dec 1970

DOT-OS-A9-018

Start Date: 21 05 69

Estimated Completion Date: ~~01 71~~ 08 71

Kind of Report: New

Performing Organization Name: Serendipity, Inc.
Special Studies Division
2001 Jefferson-Davis Highway
Arlington, Virginia 22202

Principal Investigator, Name: Safeer, Harvey
Program Manager, Special Studies Division

Responsible Government Organization, Name: Department of Transportation
Asst. Secretary for Research & Technology
Office of Noise Abatement
800 Independence Ave., S.W.
Washington, D.C. 20590

Responsible Government Individual, Name: Paullin, Robert L.
Chief, Regulatory Policy & Standards Div.
Office of Noise Abatement

Key Words: Assessment of transportation noise abatement problems; potential solutions; all modes of transportation - airplanes, buses, trucks, autos, trains, and boats.

Title: A Study of the Magnitude of Transportation Noise Generation and Potential Abatement.

Summary: Determine the magnitude of the transportation noise abatement problem in the U.S. and develop a set of analytical tools which can be used to determine the extent of the problem in the future and to evaluate alternative proposals for noise abatement; provide a comprehensive analysis of the current technical, economic and legal limits of noise reduction, and estimates of what they may be in the future; determine the level of responsibility (public and private) for noise abatement, and the ability at each level to provide the necessary resources to implement noise abatement programs; determine the need for government standards and regulations for transportation noise abatement, to establish specific recommendations for standards and regulations and their means of enforcement; determine the scientific research needed to understand noise abatement and develop a research program which will maximize the expected return from all related resource allocations; determine how to provide transportation services that produce acceptable noise exposure in populated areas, given the operation, economic, social and political constraints.

Resources Estimate, Funds: $492,683

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Research & Development Contracts

Title	Contract/Contract No./ Date Signed	Amount	FY Funds	Report Due	Report Received	State
SAE Urban Noise Study (Machine noise/Operator Tolerance)	Society of Automotive Engineers (Southwest Research Institute) DOT-OS-A9-016 signed 10/13/68	$4,290	1969	7/69	12/69	N.Y.
Metropolitan A/C Noise Abatement Study (Logan) (Joint with HUD)*	Bolt Beranel & Newman/DOT-OS-A9-009 signed 8/23/68	22,860 8,167 Mod. 31,027*	1969	6/69	3/70	Mass.
Transportation Noise Study	Serendipity, Inc. DOT-OS-A9-018 signed 5/21/69	492,683 16,270 Mod. 80,000 Mod. 588,953	1969 1971 1971	1/71 8/71		Va.
Noise Criteria Evaluation	University of Washington DOT-OS-A9-036 signed 12/2/68	24,402	1969	9/69	3/70	Wash.
Acoustical Measurements (Subway)	Bolt Beranek & Newman DOT-OS-A9-040 signed 4/1/69	16,778	1969	9/69	2/70	Mass.
Transfer to FAA (Wyle Lab ent.) V/STOL Noise Characteristics	DOT-OS-A9-039 signed 1/17/69	40,000	1969	12/69		Calif
Transfer to HUD (MANAPS)	DOT-OS-A9-072 signed 2/25/69	100,000	1969	6/70		Fla. N.Y. Ill. Conn
Transfer to FAA (ADS) for Glide Slope Computers	DOT-OS-A9-086 signed 5/21/69	50,000	1969	12/70		N.J.

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OFFICE OF NOISE ABATEMENT

Research and Development Contracts

Title	Contract/Contract No./ Date Signed	Amount	FY Funds	Report Due	 Received	State
Impacts & Alleviation of Transportation Noise	Univ. of California DOT-OS-A9-118 signed 6/30/69	$125,466	1969	Phase I-10/70 Phase II-~~10/71~~ 12/72		Calif.
Formulation of Noise Stds. (Support of Acoustical Soc. of America Stds Activities)	National Science Foundation DOT-OS-00006 signed 10/8/69	21,400	1970	6/70	10/70	D.C.
Tire Acoustics Program	National Bureau of Standards DOT-AS-00014 signed 10/15/69	50,000	1970	7/70	Rewrite	D.C.
Modeling for Jet Noise	U. of Southern California DOT-OS-00002 signed 12/19/69	236,166	1970	Qrtrly		Calif.
	Second Yr. Grant signed 1/18/71	126,883	1971			
		363,049				
Advisory & Info Services for Trans. Noise Abatement	National Academy of Sciences Highway Research Board, Task #3 DOT-OS-00035 signed 1/28/70	116,000	1970	1/71		D.C.
	Amendment #2 (Continue thru 8/71)	50,000	1971			
		166,000				
Truck Tire Noise Investigation	National Bureau of Standards DOT-AS-10004 signed 8/27/70	100,000	1971			D.C.
	Amdmt #1 (2nd half FY-71)	100,000	1971			
		200,000				
Clean Air Car Race	Bolt Beranek & Newman, Cambridge, Mass. Purchase Order PS-10123 dated 8/4/70	2,500	1971			Mass.

[illegible]

OFFICE OF NOISE ABATEMENT

Research and Development Contracts

Title	Contract/Contract No./ Date Signed	Amount	FY Funds	Report Due	Report Received	State
Aircraft & the Environment	Society of Automotive Engineers, Inc., N.Y., N.Y. DOT-OS-10025 dated 2/17/71	8,855	1971	6/71	6/14/71	N.Y.
Field Noise Monitor	B&K Instruments, Inc., Cleveland, Ohio DOT-OS-10183 dated 5/14/71	17,099	1971	N/A		Ohio

DEPARTMENT OF TRANSPORTATION

TRANSPORTATION SYSTEMS CENTER
CAMBRIDGE, MASS.

PROJECT PLAN AGREEMENT

GWA NO.	2. PPA NO.	REV. NO.	AFFECTS PAGES	3. DATE:
72-OS	OS207	0	1-9	August 23, 1971

4. TITLE: Transportation Noise Abatement

5. SPONSOR:
Mr. Charles R. Foster, TST-50
Office of Noise Abatement
DOT/400 Seventh Street, S.W.
Washington, D.C. 20591
(202) 426-4553

7. TASK MANAGER:
John E. Wesler, TME
DOT/Transportation Systems Center
55 Broadway
Cambridge, Massachusetts 02142
(617) 494-2258

6. SPONSOR NO.:

8. RELATED PPAS:

9. BRIEF TECHNICAL SUMMARY: In continued cooperation with the OST Office of Noise Abatement, TSC will work in two broad areas of transportation noise abatement: (1) continue measurement and simulation modeling of community noise levels created by transportation-related sources; and (2) conduct research into the mechanisms of noise generation by jet engine exhausts, V/STOL aircraft, and internal combustion engines. In addition, TSC will provide technical support in all aspects of transportation noise abatement, providing suitable expertise on call, monitoring research contracts negotiated by the Office of Noise Abatement, and directing demonstration projects as appropriate. Further, the TSC Task Manager will serve as the focal point for all noise abatement activities involved in other programs underway at TSC for coordination purposes.

10. RESOURCE REQUIREMENTS:

	FY 71	FY 72	FY
DIRECT MANYEARS	6.6	10.5	
SALARIES & BENEFITS $K	140.0	210.0	
MAJOR EQUIPMENT	44.0	125.0	
RESEARCH CONTRACTS	142.0	275.0	
IN-HOUSE SERVICES & OTHER	104.0	134.0	
INDIRECT	160.0	231.0	
TOTAL	590.0	975.0	

11. APPROVALS:

	TSC	SPONSOR
BY:		
TITLE:	Director of Technology	
DATE:		

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DRAFT

12. DESCRIPTION OF WORK:

Transportation noise abatement constitutes an important program within the Department of Transportation, with high priority and emphasis. This importance is clearly evident in the Departmental budget submitted to the Congress. The Transportation Noise Abatement program will receive correspondingly high priority and attention at TSC.

1. Noise Abatement

A. Surface Transportation Vehicle Noise Reduction:

No specific work at TSC is planned under this portion of the Departmental noise abatement program. As noted in the Brief Technical Summary above, however, TSC will provide technical support and suitable expertise on call to assist the Sponsor in monitoring or directing projects in this grouping.

B. Right-of-Way (Guideway) Noise Reduction:

Begin research and field measurements to assess the effectiveness of various types of noise barriers, highway depressions, and elevations, in reducing the transmission of highway noises to wayside areas. This work will encompass the refinement and expansion of noise prediction procedures along surface transportation guideways, including the effects of various types and configurations of barriers in reducing noise levels in adjacent areas. Actual field measurements of the effectiveness of existing barriers will also be made, for comparison and validation of the prediction procedures. The ultimate goal of this work is the development of meaningful information to guide highway and guideway designers in reducing noise exposure impact on neighboring land areas.

C. Research on Noise Generation Mechanisms:

(1) Jet Exhaust Noise Basic Research. Continue basic research into the noise generation mechanisms of jet engine exhausts, begun during Fiscal Year 1971. Initial contracted research began a systematic analysis of laboratory-scale jet flows, using a shock tunnel and cold gas jets to generate flow patterns. Shadowgraphic and holographic techniques are in use to visualize the shockwaves present in the jet exhausts, for correlation with simultaneous acoustic measurements. These experimental results are being used to validate theoretical analyses of the noise generation mechanisms, in order to permit an improved understanding of these phenomena, leading to development of effective noise suppression techniques. The Fiscal Year 1972 work will continue the analyses begun in Fiscal Year 1971, extending the experimental work to additional nozzle shapes and designs, and operating parameters. It is anticipated that the second year of this research effort will provide definitive guidelines and potential approaches for suppressing

jet exhaust noise. This work will extend through the summer of 1972 to take advantage of summer academic research at MIT.

(2) V/STOL Noise Basic Research. Continue research into the generation and propagation of noise into urban areas by V/STOL aircraft, begun in Fiscal Year 1971. The previous work investigated two areas of importance in assessing the potential impact of V/STOL operation into city-center areas: (a) trade-off studies to relate noise characteristics of possible V/STOL designs to their operating conditions, and the probable effect on operating cost of imposed noise constraints; and (b) theoretical and experimental studies of sound propagation into typical city-center environments. The goal of this work is an improved understanding of V/STOL noise levels in urban areas in order to provide better technical bases for future standards and certification criteria. The Fiscal Year 1972 work will extend the studies begun in Fiscal Year 1971. Specifically, work will continue using laboratory scale models to predict noise levels in a typical urban environment. Theoretical studies of this problem will also continue, to include the effects of non-specular reflections from building faces, and the limits imposed by diffraction on the shielding of buildings. It is also planned to simulate an urban area surrounding a vertiport or stolport, such as that proposed for a floating Manhattan stolport, and measure noise levels associated with STOL aircraft operations. A second area of effort will include actual field measurements of VTOL and STOL aircraft flying over open terrain for calibration, and over city streets to validate laboratory simulations. These measurements will made by the TSC mobile van and crew. The third area of effort will involve laboratory studies of rotor and STOL propeller noise, for inclusion in further noise-design trade-off studies of potential VTOL and STOL aircraft, including a tilt-rotor VTOL concept and STOL configurations including fan jet noise and lift-augmentation devices. As the result of this second year of study, it is felt that substantial information will be available to guide future designs of V/STOL aircraft for urban transportation. This work will extend through the summer of 1972 to take advantage of summer academic work at MIT.

(3) Internal Combustion Engine Noise Research. Begin a study of the most promising approaches to the reduction of noise radiated from typical internal combustion engines used to power ground transportation vehicles. Initial emphasis will be placed on diesel engines, commonly installed in heavy trucks and buses, since these vehicles constitute the loudest types commonly found on urban streets and interstate highways. If feasible, this work will also be extended to other troublesome vehicles. It is planned that the ICE noise research will proceed concurrently with other work at TSC in reducing exhaust emissions of diesel engines and similar power plants appropriate to ground transportation. If the emission program fails to materialize at TSC, the Fiscal Year 1972 work will develop a meaningful longer-term ICE noise reduction

program, and begin an appropriate demonstration project, within the funds available.

D. Noise Measurement, Analysis and Information:

(1) Continue a program of measurement of community noise characteristics caused by transportation-related sources. During Fiscal Year 1971, a mobile noise measurement van was procured and outfitted at TSC to permit field noise level analysis, and a crew of engineers and technicians was trained in its use. The van and crew conducted a three-month survey of the noise levels present in the town of Medford, a suburb of Boston. That project provided an in-depth analysis of community noise levels. During Fiscal Year 1972, the van's equipment capabilities will be expanded through the addition of a multi-channel tape recorder, additional microphones, and other improved apparatus. In addition, portable equipment will be acquired for use in remote measurement of transportation noise levels at sites such as Pueblo, in subway stations, and at similar locations where use of the van is inappropriate or inconvenient. Additional TSC personnel will be trained in the recording, measurement, and analysis of transportation noises, to expand the ability to perform field measurements, and to man an additional mobile van which may be assigned to TSC, following completion of a research program at the National Bureau of Standards, under the sponsorship of the Office of Noise Abatement. The van(s) will continue the program of field noise measurements begun in Fiscal Year 1971, to provide measurements of air and ground vehicle noises to compare with simulation model results, to measure the abatement characteristics of barriers, roadway depressions, and similar design characteristics for highway planning, to measure the noise characteristics of new types of transportation vehicles (such as the tracked air cushion type) for determination of their potential environmental impact, and to survey further the noise levels existing in American communities.

(2) Continue the refinement and expansion of the airport noise exposure simulation, begun in Fiscal Year 1971, in order to assess and compare alternative approaches to the reduction of the noise impact on airport neighbors. This developmental effort will concentrate on improved interactive input and display techniques, in order to permit simpler use of the simulation model by airport planners and similar groups. In cooperation with the program sponsor, the simulation model will be used in various analyses, such as the cost-effectiveness comparison of airliner engine retrofit begun during Fiscal Year 1971 and continuing into Fiscal Year 1972. In addition, physical elements included in the simulation program will be refined and expanded to assure accurate representation of the acoustical aspects involved.

3. INTERFACES:

The performance of this work will require the close coordination and cooperation of the Office of Noise Abatement, Office of the Secretary, to insure that the actual work performed is meaningful and related to the overall program of the Office. Close contact and supervision will also be required with those contractors which will perform selected portions of the work program. Finally, continued close liaison with other government agencies, such as the Department of Housing and Urban Development regarding noise standards for land use, will be maintained, to insure the widest possible benefit to the public from work accomplished at TSC.

14. SCHEDULES:

The following milestones are appropriate to each of the task areas described above:

Task 1 A	No specific work planned initially.
Task 1 B	Traffic Noise Guidelines and Standards drafted - 1 Jan 1972 Summary report drafted - 30 June 1972
Task 1 C (1)	First year's research completed - 1 October 1971 Second year's research completed- 1 October 1972
Task 1 C (2)	First year's research completed - 1 October 1971 Second year's research completed- 1 October 1972
Task 1 C (3)	Summary report drafted - 30 June 1972
Task 1 D (1)	Technical reports of each field measurement project as it is completed
Task 1 D (2)	Aircraft/Airport System Noise model ready for simple interactive use and graphic display of results - 1 January 1972

15. PROCUREMENTS:

Research and development contracts are anticipated in three of the five task areas, as outlined in the attached program summary. Equipment procurements are planned to augment the mobile van's measurement capabilities, and to expand the graphic display and interactive use of the noise simulation models.

16. MANAGEMENT:

The Transportation Noise Abatement program will be managed within the Electromechanical Branch, Mechanical Engineering Division of the

Technology Directorate, Transportation Systems Center

17. REVIEW AND REPORTS:

The TSC Task Manager will furnish the Director, Office of Noise Abatement:

a. Monthly technical progress reports
b. Annual summary report
c. Individual technical reports covering results of important projects
d. Oral program reviews as required.

18. CONTROLS:

All work will be conducted with the close coordination of the Director, Office of Noise Abatement, Office of the Secretary.

FINANCIAL SUMMARY

TASK	LABOR	R&D CONTRACTS	EQUIPMENT	ADP IN-HOUSE SERVICES	OTHER	TOTAL
1A						0
1B	2½/$105K	$ 50K			$ 20K	$175K
1C (1)	½/ 21K	75K			4K	100K
1C (2)	½/ 21K	150K			4K	175K
1C (3)	1/ 42K				8K	50K
1D	6/ 252K		$ 125K	$ 60K	38K	475K
1E						0
	10½/$441K	$275K	$125K	$ 60K	$ 74K	$975K

Direct Labor @ $20K/MY
Overhead @ $22K/MY
$42K/MY

TRANSPORTATION SYSTEMS CENTER

PPA: OS207

TITLE: Transportation Noise Abatement

FUNDING: [illegible]

BRIEF PROJECT DESCRIPTION:

Perform work in two broad areas of transportation noise abatement: (1) continue measurement a[illegible] simulation modeling of community noise levels created by transportation-related sources; and (2) conduct research into the mechanisms of noise generation by jet engine exhausts, V/STOL aircraft, and internal combustion engines.

TASK	FY'71				FY'72												FY'73			
	1Q	2Q	3Q	4Q	J	A	S	O	N	D	J	F	M	A	M	J	1Q	2Q	3Q	4Q
1B Right-of-Way Noise Reduction: Adapt highway noise model					Begin Refinement △			Refinement Complete △		Ready For Use △		Continued Refinement and Use								
Study effectiveness of highway noise barriers						Begin Field Analysis △			Complete Analysis △											
Prepare highway noise standards					Begin Analysis △					Standards Drafted △										
1C(1) Jet Exhaust Noise Basic Research: Continue MIT contracted work			FY71 Contracts Awarded ▲				FY72 Contracts Awarded △										Final Report △			
1C(2) V/STOL Noise Basic Research: Continue MIT contracted work		FY71 Contracts Awarded △					FY72 Contracts Awarded △										Final Report △			

LEGEND:
△ SCHEDULED
▲ ACCOMPLISHED

REMARKS:

AMR MAY 7, 1971

TRANSPORTATION YSTEMS CENTER

PPA: OS207	TITLE: Transportation Noise Abatement	FUNDING: $975K
BRIEF PROJECT DESCRIPTION:		

TASK	FY'71				FY'72												FY'73			
	1Q	2Q	3Q	4Q	J	A	S	O	N	D	J	F	M	A	M	J	1Q	2Q	3Q	4Q
1C(3) ICE Noise Basic Research: Prepare diesel engine noise reduction program																Final Report △				
1D Noise Measurement: Expand mobile van capability Perform field measurements				Procurement Package △				Receive Equipment △	Install Equipment △											
Interactive use and graphics for airport noise model	Model Received △									Ready For Use △		Continue Refinement and Use								
Hire new personnel for Program			PDS △				Hire △													

○3

LEGEND: △ SCHEDULED △ ACCOMPLISHED	REMARKS: New Personnel: Hire two Acoustic Engineers 10-1-71.

AMR MAY 7, 1971

TRANSPORTATION SYSTEMS CENTER

TECHNICAL PROGRESS REPORT

for June 1971

GENERAL WORK AGREEMENT NO.: 71-OS-2

PROJECT PLAN AGREEMENT NO.: OS-07-1

TITLE: Transportation Noise Abatement

TASK MANAGER (TSC): J. E. Wesler

APPROVED:

TASK MANAGER: JEWesler
J. E. Wesler

DIVISION CHIEF: AJR Schneider
A. J. R. Schneider

OPERATING DIRECTOR. L. W. Roberts Jr.
Gene G. Mannella

TRANSPORTATION SYSTEMS CENTER

TECHNICAL PROGRESS REPORT

GENERAL WORK AGREEMENT NO.: 71-OS-2

PROJECT PLAN AGREEMENT NO.: OS-07-1

TITLE: Transportation Noise Abatement

TASK MANAGER (TSC): J. E. Wesler

1.0 SUMMARY

During Fiscal Year 1971, the following significant accomplishments were derived from the Transportation Noise Abatement program at TSC:

a. A mobile noise measurement laboratory was purchased and outfitted, and a crew of engineers and technicians was trained to provide field measurements of community noise levels.

b. An extensive survey of community noise levels existing in a typical metropolitan suburb was completed, by measuring noise levels at 50 selected sites in Medford Massachusetts.

c. A brief, informal survey of noise levels present in the Everglades of Florida was performed to document noise conditions in that relatively uninhabited environment.

d. A computer program, initially developed by Serendipity, Inc., under contract to the OST Office of Noise Abatement, was adapted to the computers at TSC, and the program's capability was expanded significantly to allow automatic calculation and plotting of noise exposure contours around airports.

e. The expanded airport noise exposure computer program was applied to an analysis of the cost-effectiveness of engine retrofits for commercial airliners on a world-wide basis, in support of the OST Office of Noise Abatement work within the ICAO Committee on Aircraft Noise.

f. Three research contracts were negotiated with MIT for laboratory studies of the mechanisms of jet exhaust and V/STOL vehicle noise, with the goal of better understanding of these noise-generation factors and of the most promising means for noise reduction.

g. The feasibility of adapting a split-beam laser velociter as a remote sound and vibration detector was demonstrated in the laboratory, and a patent application for this technique was submitted for legal processing.

h. The Task Manager for the Transportation Noise Abatement program began to serve as the focal point at TSC for noise abatement efforts, by participating in review procedures and limited contracted research on tracked air cushion vehicle noise sources and predicted performance.

2.0 TECHNICAL DISCUSSION

The work underway at TSC in the Transportation Noise Abatement program during Fiscal Year 1971 was initially divided into three general categories. As the work progressed during the year, however, a fourth or miscellaneous category was created to encompass a number of smaller informal efforts performed in cooperation with the OST Office of Noise Abatement. The technical discussion which follows is organized along these four categories of work.

2.1 Modeling and Field Measurement of Community Noise Levels

As a part of its extensive contract with the OST Office of Noise Abatement, Serendipity, Inc., developed three simulation models to calculate noise exposure conditions caused by aircraft operations near airports, ground transportation vehicles along guideways, and the composite community noise levels generated by all modes of transportation. The original Serendipity computer listing for the airport noise simulation model was delivered to TSC in late September 1970, for adaptation to the computers at TSC. The adaptation and expansion efforts culminated in the Airport Noise Exposure Model MOD 4, which was 'frozen' at TSC in May 1971. The details of this model were reported in the TSC Technical Progress Report for May 1971, and need not be repeated here. A formal TSC report, describing this model and serving as a user's manual, has been drafted and will be issued in early August 1971.

The second Serendipity model, for ground transportation noise exposure simulation, was delivered to TSC early in calendar year 1971. Because of the higher priority for the airport noise model, only limited efforts were devoted to the so-called highway noise model. The only work accomplished has been a brief review of the computer listing, in order to understand the procedures involved and the probable efforts necessary to adapt the model to TSC computers and streamline its operation. The third model, simulating composite community noise levels, was still under development by Serendipity at the end of the fiscal year. ceipt and adaptation of this model at TSC is expected during scal Year 1972.

In the adaptation and expansion of the airport noise exposure model, the specific application of the procedures to Logan International Airport, Boston, was used for learning purposes. During the spring and summer of 1971, TSC personnel worked closely with FAA regional personnel, and representatives of the Massachusetts Port Authority (the operators of Logan Airport) to obtain meaningful airport information and to develop relevant analyses. The results of all these analyses have been retained at TSC and are considered entirely developmental in nature. Nevertheless, these preliminary results have provided valuable insight into noise problems at a U. S. Airport. A further adaptation of the Airport Noise Exposure Model MOD 4 was also applied to an analysis of noise exposure levels at seven international airports, for 1975 and 1980, and for several alternative levels of engine retrofit, in support of the OST Office of Noise Abatement committment to the ICAO Committee on Aircraft Noise. This ICAO work began to produce usable results only during June 1971, and will continue into Fiscal Year 1972.

The second major area of work during Fiscal Year 1971 under the general category of community noise modeling and field measurement involved the procurement and outfitting of a mobile oise measurement laboratory, and the training of a crew of ngineers and technicians to man that laboratory. Details of the van and its included equipment were included in several monthly Technical Progress Reports, and need not be repeated here. As soon as it was available, and the crew familiar with its operation, the van was used to survey noise levels existing in Medford, Mass., a nearby suburb of Boston. Medford was selected for this analysis because of its proximity to TSC, its variety of environments (from busy industrial sites to a serene park and reservior area), its ready availability of traffic flow and demographic information, and (primarily) its inclusion of major highways, railways, and Logan Airport overflights within its boundaries. Noise level recordings and analyses were made at 50 sites within Medford, with the sites selected randomly throughout the town area. At five of these sites, analyses were made throughout a 24-hour weekday period, and were analyzed in hourly segments. At 45 additional sites, measurements were made from 0730 to 0830 and from 1130 to 1230 on a weekday between 1 March and 15 May 1971. The format and method of presentation of the measurements were included in the Technical Progress Report for March 1971, and need not be repeated here. Pertinent preliminary results have been relayed to the Serendipity, Inc., for inclusion in its continuing development of a composite community noise level model. A formal report is nearly complete, and should be published early in August 1971.

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2.2 Research into Mechanisms of Jet Engine Exhaust Noise

This phase of the Fiscal Year 1971 program at TSC initiated two research contracts at MIT, intended to provide a better understanding of the physical phenomena governing noise generation by jet exhausts. The ultimate goal of such work is improved approaches to the reduction of such noise. The first contract, formally begun on 15 November 1970, involves the use of shadowgraphic and acoustic analyses of jet flows produced in the MIT laboratory by a shock tunnel technique. This device provides repeatable brief-duration, high-velocity jets without elaborate requirements for high temperature materials and anechoic surroundings. The results of a systematic study of two jet nozzle configurations, under the direction of Dr. Jean Louis, is due 30 September 1970.

The second research contract at MIT, formally begun on 15 February 1971, involves the use of optical holographic visualization techniques, in correlation with acoustic measurements to analyze jet flow shock'wave generation. Here, cold gas jets are generated in the laboratory to provide the sound source. These analyses, under the direction of Dr. Richard Salant, are due for completion in draft report form on 14 March 1972.

As a portion of this program phase, preliminary development of a laser sound probe was conducted at TSC to demonstrate, at least in the laboratory, the feasibility of this approach to the remote detection of sound and/or vibrations in a jet flow, for example. An informal report describing the results of this developmental effort will be issued during July 1971. Briefly, through the use of laboratory equipment on hand at TSC, a split-beam laser velocimeter was fabricated and demonstrated capable of detecting sound fields and surface vibration from a remote point. TSC personnel participating in this developmental work have prepared a patent disclosure covering the general concept. The final report will assess the potential capabilities and limitations of the approach, and will recommend further action, if any, for future use.

2.3 Research into Noise Generation and Propagation by V/STOL Vehicles

This phase of the Fiscal Year 1971 program at TSC initiated one research contract at MIT to study, both experimentally and theoretically, noise propagation into a typical city-center environment from V/STOL vehicles, and to assess the design and operating limitations which may be imposed on commercial V/STOL operation by possible noise abatement restraints. This work, formally begun on 15 October 1970 under the direction of Drs. Richard Lyon and Sheila Widnall, is scheduled for completion on 30 September 1971. Dr. Lyon's portion of the study involves the theoretical and experimental analyses of noise propagation into urban area comprised of typical downtown buildings and streets. 32:1 scale model of a city intersection, plus an alley way, was fabricated in the laboratory at MIT, and sound level measurements using both steady-state and spark (impulse) sound sources are being performed. To date, street-level sound levels produced by typical VTOL flyovers have been measured for a variety of situations, and the results related to a comparable open-field situation. The impulse sound source will be used in attempts to ray-trace the sound paths among the scale-model "buildings."

Dr. Widnall's area of work responsibility includes simulations of noise characteristics of VTOL aircraft elements, for inclusion in simulation models of urban noise propagation, and V/STOL vehicle design factor tradeoffs relative to operating constraints possibly imposed by noise abatement procedures or limitations. The results of the entire contract efforts are reported bi-monthly by the two Principal Investigators.

In-house at TSC, to augment the contracted work underway at MIT, a brief analysis examined the possibility of applying optical diffraction theory to the calculation of sound levels among buildings at street level in an urban environment. Within funding limitations available for this small effort, a computer program was prepared to calculate the sound field inside a two-dimensional "channel", representing the canyon between two tall buildings. Preliminary calculations demonstrated the increase in sound level from an elevated source, due to multiple reflections from the building faces. Brief details of this analysis are appended as Attachment 1 to this report.

2.4 Miscellaneous Activities at TSC in Noise Abatement

Following informal discussions with the Director, OST Office of Noise Abatement, a very brief analysis was performed to determine the feasibility of using a microwave link to transmit acoustical measurements from a number of remote locations to a central recording and analyzing van. Three basic systems were examined for such use:

a. microwave relays
b. high-quality telephone lines
c. optical transmission links

A brief report of this study is appended as Attachment 2 to this report. In summary, it appears that all three of the concepts are feasible, and could be implemented in a resonably short time.

Reflecting the coordinating role of the Director, OST Office of Noise Abatement, in consolidating the noise abatement activities for the entire department, the Task Manager for the Transportation Noise program at TSC has effectively begun to act as a focal point for noise control and abatement activities at TSC. As an example of this role, the Task Manager has actively participated in work sponsored at TSC by the Urban Mass Transportation Administration in the development of tracked air cushion vehicles. This participation included cooperation in the drafting of noise level specifications for the TACV originally intended for use at the Dulles Airport Access and later used as the basis for two developmental contracts for TACV's for undetermined sites, participation in two proposal evaluation teams, and management of a study contract (under UMTA funding) for the analysis of TACV noise sources and characteristics. The details of this contract were included in the Technical Progress Report for April 1971, and need not be repeated here. The final report of that work is due 15 July 1971.

3.0 SIGNIFICANT DOCUMENTATION

No significant documentation has been published to date as the result of the Transportation Noise Abatement program at TSC. Formal reports are in draft describing the results of noise measurements in the Everglades, the Airport Noise Exposure Model MOD 4, and the results of the noise level survey of Medford, Massachusetts, and these will be published early in Fiscal Year 1972.

4.0 MILESTONES

All scheduled milestones for the Transportation Noise Abatement program were met, as indicated on the attached Milestone Schedule. In general, it is felt that the entire program progressed well during this first year of its activity at TSC. The only major schedule deficiency was the failure to achieve all the required ICAO airport noise exposure analyses by the end of the fiscal year. All other schedules were met as planned.

5.0 FINANCIAL MANAGEMENT

See attached Financial Progress Report.

Attachments:

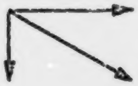
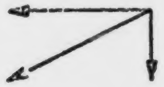
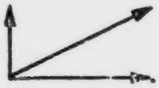
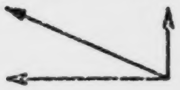
1 - Brief description of acoustic reflection program
2 - Brief report of remote data collection systems
3 - Milestone Schedule
4 - Financial Progress Report

Attachment 1

Brief description of acoustic reflection program to calculate noise levels between buildings:

The geometry of the problem is shown in Fig. 1. A plane acoustic wave is incident upon the channel so that the rays make an angle θ with the x-axis. The sides and bottom of the channel (simulating the sides of buildings and a city street) are assumed to be perfectly hard so that they impose upon the acoustic pressure field, P, the boundary condition, $\partial P/\partial n = 0$, where $\partial/\partial n$ denotes the normal derivative at each surface. This condition determines the phase change experienced by the wave at the surface and could be relaxed to take into account mixed boundary conditions with losses if necessary.

To determine the sound pressure field at an arbitrary point in the channel, it is noted first that there are at most four non-zero contributions at each point. Denote the wave vector of the incident wave by $k = (k_x, k_y)$. With the coordinate axes of Fig. 1, $k_x > 0$ and $k_y < 0$. The four possible contributions to the pressure will therefore come from rays with the following wave vectors:

Type	1	2	3	4
Vector	(k_x, k_y)	$(-k_x, k_y)$	$(k_x, -k_y)$	$(-k_x, -k_y)$
Diagram				

In the above set, wave types 1 and 2 characterize descending rays, while types 3 and 4 characterize ascending rays that have been reflected from the bottom of the channel. The logic of the computer program is designed to determine which, if any, of the four ray types actually contribute to the sound pressure at any point in the channel for any direction of incidence. For descending rays a point in OBC is in shadow for types 1 and 2. If a line with slope $m = \tan\theta$ is drawn through any point inside this triangle, its x-intercept will be negative (to the left of the origin) which corresponds to the fact that no point in OBC receives a direct ray. If a line of slope $m = -\tan\theta$ is drawn, it intersects the line $x = w$ in $y > 0$, which corresponds to the fact that no ray reflected from the surface at $x = w$ enters the triangular region. Similar rules can be found to show that OAC receives rays of type 1 but not 2, while ACD receives both types 1 and 2. The ascending ray diagram shows similar but displaced regions for ray types 3 and 4. Note that the incident ray bundle ab is split into two diverging bundles when it leaves the channel. Having determined which ray types are able to reach a particular point, the computer can then calculate complex amplitudes of the resultant sound pressure.

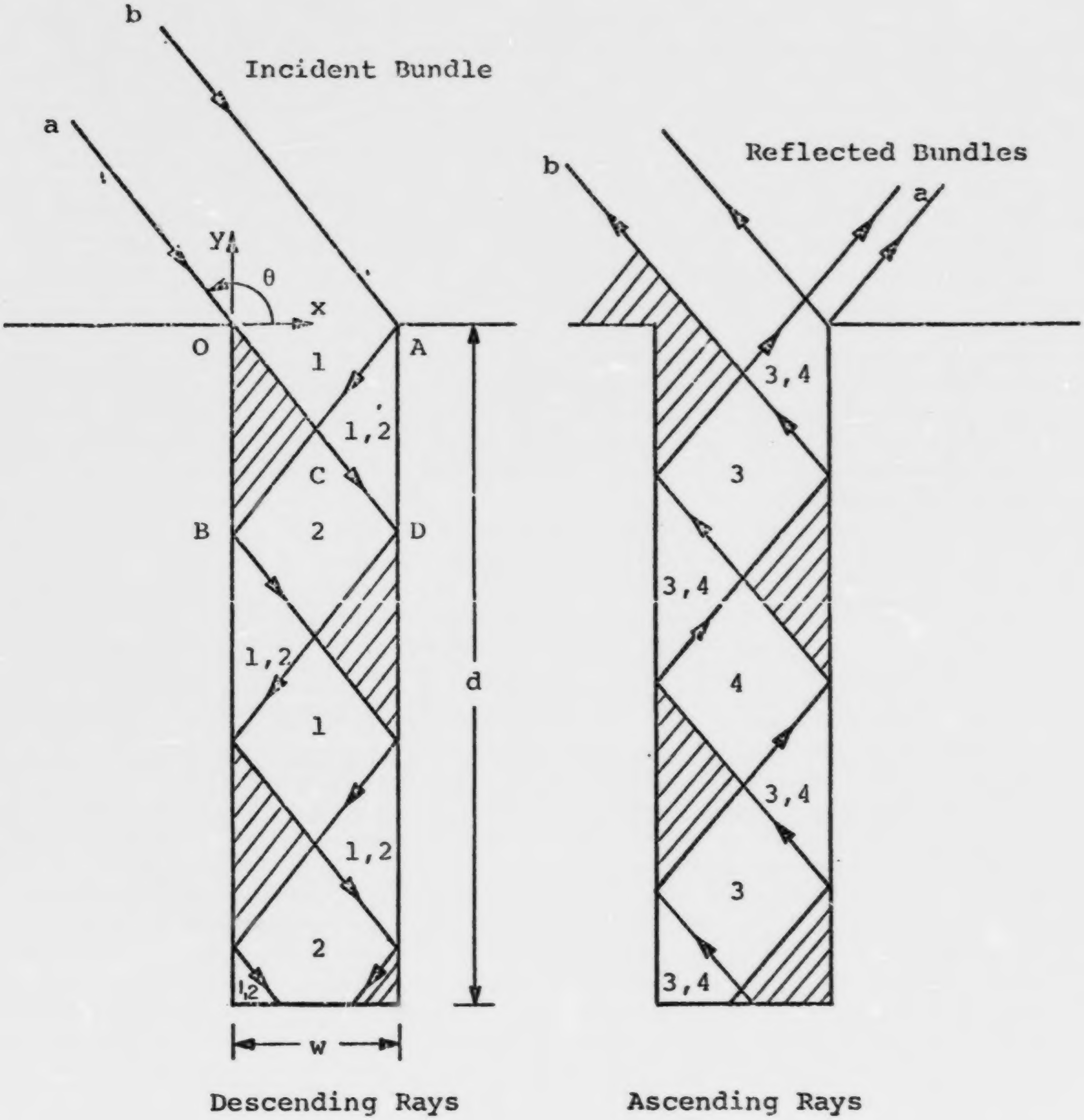

b
Incident Bundle
a
y
θ
x
O
A
1
1,2
C
B
2
D
1,2
1
d
1,2
2
1,2
w
b
Reflected Bundles
a
3,4
3
3,4
4
3,4
3
3,4
Descending Rays
Ascending Rays

Figure 1.- Reflection from a Channel

Attachment 2

Brief report on remote data collection systems:

Three basic systems were investigated:

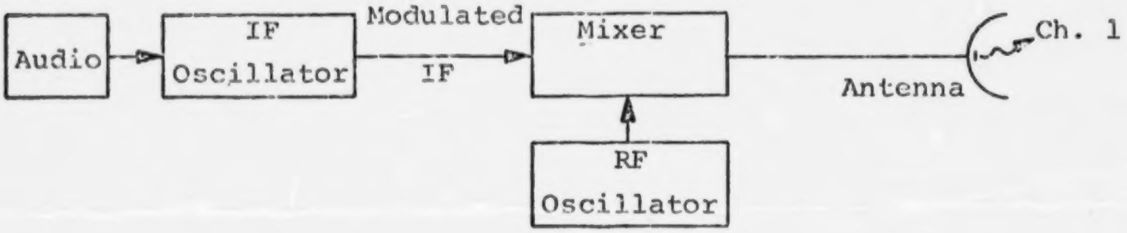
1) Microwave relays
2) High-quality telephone lines
3) Optical transmission

Microwave Relays

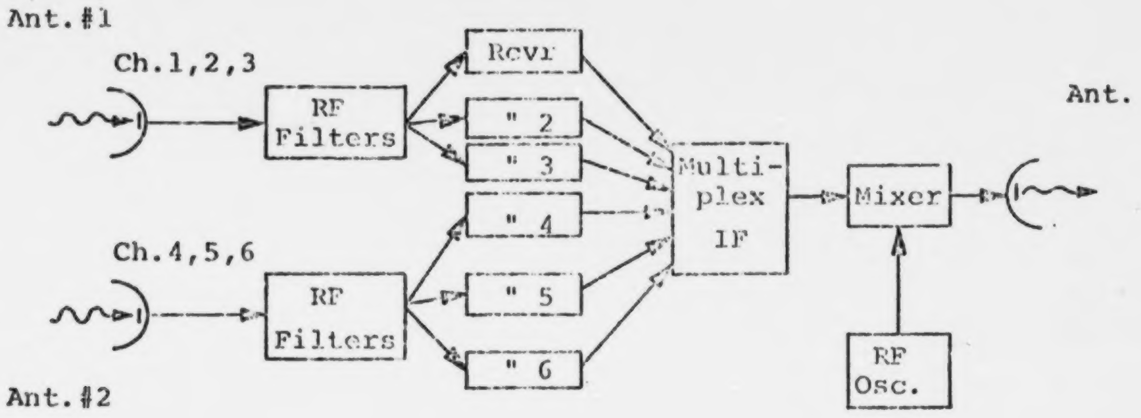
a) As anticipated, a large number of companies are in a position to supply microwave links with widely varying capacity and cost. These range from companies like GE and Raytheon that manufacture complex and expensive equipment for long distance communications systems, to those like AIL and Microwave Associates that specialize in smaller and less costly special purpose equipment.

The two most interesting proposals were made by these latter organizations, both of which have considerable experience with short range microwave relay links. AIL has marketed a Portable Wireless Microphone which was originally designed for use at the 1968 presidential conventions in order to transmit mobile voice to the fixed-camera audio channel. They quote six one-way links at $70,000.

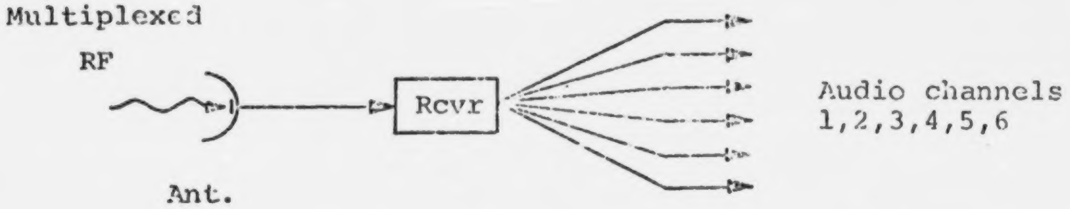
Microwave Associates has no commercial system available. However, they have proposed to assemble a system consisting of six links to a central terminal which would relay one multiplexed signal to the recording van. Their estimated price in February was $66,000, remarkably close to AIL's. The μ Wave Assoc. system would be organized as follows:



N channels similar to the above would transmit to a central collecting point on a convenient high building. This central repeater would have two receiving antennas, one for each 180° sector, and one transmitting antenna. They would be connected as shown on the following page:


Ant. #1
Ch. 1,2,3
RF Filters
Rcvr
" 2
" 3
" 4
" 5
" 6
Ch. 4,5,6
RF Filters
Ant. #2
Multi-plex IF
Mixer
RF Osc.
Ant.

From the repeater the signal would be propagated down to the suitably located mobile van where a single antenna would receive the multiplexed RF and feed it to a receiver which would provide six separate audio outputs corresponding to the inputs.


Multiplexed
RF
Ant.
Rcvr
Audio channels
1,2,3,4,5,6

Once the above system has been aligned it should give very reliable, high quality service.

High-Quality Telephone Lines

An inquiry with the New England Telephone Company revealed that it would not be very difficult to rent telephone lines to do the job at hand - in effect this would substitute existing cables for the ad hoc connections that might otherwise be required. Telephone lines are available in all urban areas. They have the following characteristics:

Response: ± 1 db, 50-15,000 Hz

Normal use: High quality FM stereo transmission

Noise Level: -55 dbm

Circuit Loss: 20-25 db

Maximum Level: 8 vu (volume units)

(i.e. 8 db above zero vu, where
zero vu = 1 mw Ωn 600 ohms at 1,000 Hz)

The telephone company representative is Mr. Bob Pierce (743-3463). He indicated that it would take two weeks initially to lay out the circuits. Subsequently, each hook-up would require 2-3 weeks for installation, equalization, test and measurement. The rates quoted are:

Installation	$10.00
Equalization, test and measurement	$15.00
Use charge	$4.10/mo. for 1st 1/4 mile $1.85/mo. for each additional 1/4 mile

If this service were to be used on a continuing basis, Mr. Pierce thought that it would probably be advisable to equip the van with a special patch panel.

From the point of view of cost, this system is clearly competitive with any other.

Optical Transmission

One possibility for line-of-sight transmission that should not be overlooked is the use of modulated laser beams. A number of suitable commercial equipments are available, the most practical of which seems to be that manufactured by Meteorological Instruments, Inc. of Bellmaur, N. J. Their modulated laser, ML-382, costs $275 and is designed for voice and data transmission. The laser is intensity modulated with a 0-5 volt signal, and capable of achieving 100% modulation up to frequencies exceeding 100 KHz. The frequency response is flat from D.C. to 100 KHz so that audio FM modulation can be used for low distortion and noise. The receiving system for such a laser, not including the receiving optics, is around $100. The ML-382 is a helium-neon laser which radiates in the red at a wavelength of 633 nm. The maximum power output is one milliwatt.

Summary

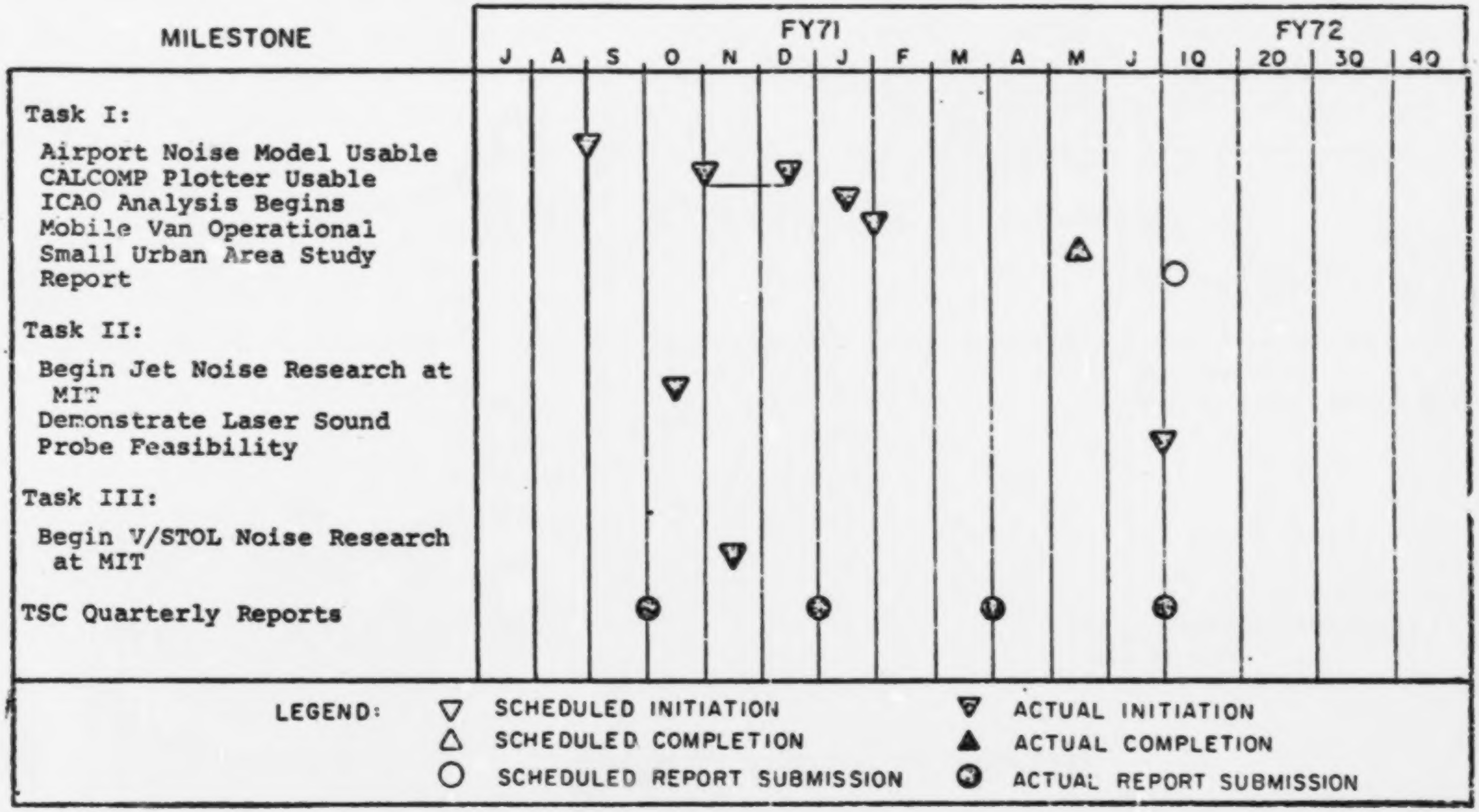
Each of the three possible data communications systems discussed above has advantages and disadvantages. The microwave system is expensive. However, once operational it would be quick to align, reliable, almost impervious to interference, and would present no environmental hazard. The laser system is cheap and easy to use, but only in clear weather. The hazard, though minimal, is present and must be considered. Telephone lines obviously offer a cheap solution with no compromise in quality. The disadvantages are primarily the long lead time required to set up the system in each location and secondarily the restrictions on location imposed by the possible lack of appropriate telephone connections.

It seems certain that one or more systems for simultaneous data collection from multiple sites is feasible and could be implemented in a reasonably short time.

MILESTONE SCHEDULE

SPONSOR DOT/OST
PPA NO. OS-07-0

STATUS AS OF June 30, 1971
ORIGINAL SCHEDULE July 1, 1970
LAST SCHEDULE CHANGE July 1, 1970



TSC F 5100.1

FINANCIAL PROGRESS REPORT

SPONSOR OST/TST

REPORT FOR
MONTH ENDING: 6/30/71
(PRELIMINARY)

PPA NO. OS-07

Dollar Items Below Are
In Thousands

	P.P.A Planned Amount	Salaries & Benef	Indirect Expense	R&D Contr	Equip	Other Expense	TOTAL	Uncom-mitted P.P.A Plan	Total Accrued Cost	Man Years Effort
OBLIGATED	580	138.3	159.1	142.2	43.4	106.5	589.5	(9.5)	507.0	7.2
COMMITTED	580	138.3	159.1	142.2	43.4	106.5	589.5			

DEPARTMENT OF TRANSPORTATION
TRANSPORTATION SYSTEMS CENTER
CAMBRIDGE, MASS.

PROJECT PLAN AGREEMENT

1. GWA NO.	2. PPA NO.	REV. NO.	AFFECTS PAGES	3. DATE:
71-OS	OS07	1	1-4	March 30, 1971

4. TITLE:
Transportation Noise Abatement

5. SPONSOR:
Mr. Charles Foster, TST-50
Office of the Secretary of
Transportation
400 Seventh Street, S.W.
Washington, D.C. 20590
(202) 426-4553

7. TASK MANAGER:
John E. Wesler, TRE
DOT/Transportation Systems Center
55 Broadway
Cambridge, Massachusetts 02142

(617) 494-2258

6. SPONSOR NO.:

8. RELATED PPAS:

9. BRIEF TECHNICAL SUMMARY: In cooperation with the Office of Noise Abatement (TST-50), the Transportation Systems Center will undertake a modeling and field measurement program to produce quantitative description of community noise resulting from transportation systems taking into account the phenomena of noise generation and propagation; and assessing possible means of supressing or reducing transportation generated noise. In addition to a variety of special analyses conducted for TST-50, TSC will undertake the computer model study of a selected city and sample field measurements to validate these results. Research will also be undertaken to develop needed additions to our understanding of jet turbulence and sheer boundary parameters associated with high velocity jet noise. Finally, TSC will undertake both in-house and with contract support, a study of V/STOL noise to delineate the area of most promising pay-off through noise abatement research.

10. RESOURCE REQUIREMENTS:

	FY 71	FY	FY
DIRECT MANYEARS	7.3		
SALARIES & BENEFITS $K	148.0		
MAJOR EQUIPMENT	51.0		
RESEARCH CONTRACTS	142.0		
IN-HOUSE SERVICES & OTHER	68.0		
INDIRECT	171.0		
TOTAL	580.0		

11. APPROVALS:

	TSC	SPONSOR	TST
BY:			/S/ Findley
TITLE:	Director of Technology	Director, Office of Noise Abatement	
DATE:	4-5-71	4-12-71	28 May 71

12. Description of Work:

Task 1 - Undertake a modeling and field measurment program to assimilate and assess community noise caused by transportation systems -

a. Program and exercise TSC digital computers to quantify the micro and macro noise environment of an urban center (prescribed by TST-50) and compute projected noise environments as influenced by postulated noise abatement alternatives. (Basic computer programs in Fortran IV are now becoming available under contract DOT OS-A9-018.)

b Expand upon and refine existing theories of sound propagation under conditions of complex urban activity and mitigating structures, terrain and vegetation.

c. Acquire and equip (with TST-50 concurrence) a high quality mobile noise laboratory with portable equipment that will be set up at numerous sites within an urban center approved by TST-50 for the measurement and monitoring of noise including acquisition of visual data and pertinent traffic flow, geographic and demographic data.

d. Acquire noise data as prescribed by TST-50 to quantify such relationships as highway traffic flow parameters effecting roadside and community noise levels, highway terrain and vegetation parameters modifying nominal highway generated noise levels; airport operational factors effecting nearby community noise levels; overall city traffic flow parameters effecting ambient urban noise levels.

Task 2 -

a. Initiate basic research contract with MIT (Prof. Lewis approx. $35K) for the investigation of fluid dynamic/turbulence/mixing parameters effecting noise generation at high jet velocities.

b. As a supporting effort, utilize TSC optical instrumentation in conjunction with the ongoing research on jet noise. TSC optical assistance is to aid in the mapping of jet turbulence and sheer boundary parameters for correlation with MIT acoustics and fluid dynamics experimentation.

c. Based upon the experience and training per above and as qualified fluid dynamics personnel can be acquired, develop independent program proposals (for TST-50 approval) aimed at basic jet and aerodynamic noise abatement.

Task 3 - Undertake contract studies ($75K) and in-house analysis of V/STOL noise to ascertain areas of maximum payoff through noise abatement research.

Each of the previously discussed tasks will start as soon as this document is approved.

13. INTERFACES:

The interface problem in this program is substantial and will require close direction by the Office of the Secretary, Office of Noise Abatement.

14. SCHEDULES and DELIVERABLES:

Task 1.a. - Begin dialog with DOT contractor, 1 September, 1970.
- Airport Noise Model usable at TSC, 1 October, 1970.
- Highway Noise Model usable at TSC, 1 July, 1971.
- Begin ICAO airport analyses, 1 February, 1971.
- Report results of ICAO airport analyses, 1 July, 1971.
- Perform airport analyses, as directed by TST-50.

Task 1.b. - Begin study of expanded model needs, 1 October, 1970.
- Report results of study, 1 July, 1971.

Task 1.c. - Begin procurement of mobile van, 1 September, 1970.
- Van operational, 1 February, 1971.

Task 1.d. - Select suburban area for noise survey, 1 February, 1971.
- Begin suburban area noise survey, 1 March, 1971.
- Report results of suburban area noise survey, 1 July, 1971.

Task 2.a. - Begin discussions with MIT,
1 September, 1970.
- Award research contracts,
1 February, 1971.
- Report results of research bi-monthly.

Task 2.b. - Begin feasibility study of sound probe,
1 August, 1970.
- Report results of feasibility study,
1 July, 1971.

Task 2.c. - Begin recruitment,
1 September, 1970.

Task 3 - Begin discussions with MIT,
1 September, 1970.
- Award research contract,
1 December, 1970.
- Report results of research bi-monthly.
- Begin in-house study,
1 January, 1971.
- Report results of in-house study,
1 July, 1971.

15. PROCUREMENT:

Principal items discussed in Item 14 above.

MANAGEMENT:

This program will be managed by the Mechanical Engineering Division of the Technology Directorate with assistance from the Computer Division and Electromagnetic Division in response to technical direction from the Office of Noise Abatement, DOT (TST-50).

17. REPORTING METHODS:

Quarterly reports with reviews and presentations as required

First report - draft copy - June 1, 1971
- final copy - July 1, 1971

Security of Report: Unclassified.

Procurement Method: Contract - Cost Plus Fixed Fee

*Modification to contract signed 11/19/70 increased the cost by $16,270 and covered escalation of Overhead and General and Administrative rates during FY-1970.)

Modification to contract signed 12/31/70 increased the cost by an additional $80,000 and covered an expansion of the scope of Task 1. Using the Aircraft/Airport model developed for the Baltimore Washington Metropolitan Area, the contractor, in cooperation with the Transportation Systems Center, will develop and implement a research and demonstration program to measure and evaluate an urban area in the Boston Metropolitan Area, and thereby validate and provide more confidence in the methodology used for evaluating noise exposure in urban areas.

~~15 May 1969~~
Updated March 1970

DOT-OS-A9-036

Start Date: 02 12 68

Estimated Completion Date: 08 69

Kind of Report: New

Performing Organization: University of Washington
Seattle, Washington 98105

Principal Investigator, Name: Dr. James D. Chalupnik, Associate Professor
Department of Mechanical Engineering

Responsible Government Organization, Name: Department of Transportation
Asst. Secretary for Research & Technology
Office of Noise Abatement
800 Independence Avenue, S.W
Washington, D.C. 20590

Responsible Government Individual, Name: Paullin, Robert L.
Chief, Regulatory Policy & Standards Div.
Office of Noise Abatement

Key Words: Criteria for measuring and evaluating transportation noise; sound level scales; subjective response scales; laboratory testing methods; field testing methods; unified noise rating system.

Title: Evaluating the Noises of Transportation - A Symposium on Acceptability of Criteria for Transportation Noise

Summary: Define and evaluate the noises of transportation with an overall goal of defining the requirements for uniform criteria and objectives for transportation noise abatement. Identify and quantify the parameters which characterize differences in the annoyance levels of different sources of transportation. A thorough understanding as to the application of differences in noise rating systems shall be developed such that an ultimate solution of the noise rating problems, i.e., the unified noise rating system, will result.

Resources Estimate, Funds: $24,402

Security of Report: Unclassified.

Procurement Method: Contract.

Other Funding Agencies: N/A

Final report received March 1970.

15 May 1969

DOT-OS-A9-040

Start Date: 01 04 69

Estimated Completion Date: 09 69

Kind of Report: New

Performing Organization, Name: Bolt Beranek & Newman
50 Moulton Street
Cambridge, Massachusetts

Principal Investigator, Name: Franken, Peter A., Vice President
Physical Sciences Division

Responsible Government Organization, Name: Department of Transportation
Asst. Secretary for Research & Technology
Office of Noise Abatement
800 Independence Avenue, S.W.
Washington, D.C. 20590

Responsible Government Individual, Name: Paullin, Robert L.
Chief, Regulatory Policy & Standards Div.
Office of Noise Abatement

Key Words: Mass transit rail systems (subways); acoustical measurements and studies; matrix of the acoustical environment.

Title: A Study for Research and Reporting on Mass Transportation Systems (Subways) Acoustical Environment.

Summary: Perform a study by reviewing available technical reports on the mass transit rail systems now in existence in foreign cities such as Toronto, Hamburg, London, Berlin, Paris, and Rotterdam. Select seven systems that appear to have the lowest noise levels. Make acoustical measurements and studies of these systems so as to complement existing data and provide additional data necessary to present a complete matrix of the acoustical environment. Analyze the results of the studies and tests and identify the parameters that define the systems acoustical environment. Rank the systems studied.

Resources Estimate, Funds: $16,778

Security of Report: Unclassified

Procurement Method: Contract - fixed price.

Other Funding Agencies: N/A

Final Report received February 1970.

OFFICE OF NOISE ABATEMENT, TRT-50

INTERDEPARTMENTAL AGREEMENTS - FY-1969:

DOT-OS-A9-086:-

Name of other agency: FAA
Date of agreement: 21 May 1969
Term for which agreement is effective: Complete December 1970
Purpose of agreement: Support the engineering development of selectable glide slope computers for operational evaluation using FAA aircraft.
Financial details: $50,000 for the procurement of 25 computers at a rate of approximately 2 units per month.
Officer maintaining cognizance: Mr. Charles H. Williams.

DOT-OS-A9-072:-

Name of other agency: HUD
Date of agreement: 25 February 1969
Term for which agreement is effective: Complete June 30, 1970.
Purpose of agreement: Provide funds to facilitate and extend HUD's research in conducting a series of Metropolitan Aircraft Noise Abatement Policy Studies (MANAPS)
Financial details: Joint funded effort - $100,000 DOT/$100,000 HUD.
Officer maintaining cognizance: Mr. Charles H. Williams.

DOT-OS-A9-059:-

Name of other agency: FAA
Date of agreement: 17 January 1969
Term for which agreement is effective: Complete December 31, 1969.
Purpose of agreement: Provide financial support for a research and development effort to examine the problems associated with VSTOL noise characteristics. This effort is an extension to an existing contract between FAA and Wyle Laboratories.
Financial details: $40,000
Officer maintaining cognizance: Mr. Charles H. Williams

9 July 1969

DOT-OS-A9-118

Start Date: 30 06 69

Estimated Completion Date: ~~06 71~~ 12 72

Kind of Report: New

Performing Organization, Name: University of California, College of Engineering,
Office of Research Services, Berkeley, California

Principal Investigator: Professor Robert Horonjeff
Office of Research Services

Alternate Investigator: Professor W. W. Soroka
Office of Research Services

Responsible Government Organization, Name: Department of Transportation
Asst. Secretary for Research & Technology
Office of Noise Abatement
800 Independence Ave. S.W.
Washington, D.C. 20590

Responsible Government Individual, Name. Paullin, Robert L.
Chief, Regulatory Policy & Standards Div.
Office of Noise Abatement

Key Words: Alleviation of environmental noise caused by transportation systems; development of criteria for evaluating the acceptability of transportation noise.

Title: Impacts and Alleviation of Transportation Noise

Summary: Make specific contributions to existing knowledge about the impact of transportation noise on community, physical, social, and economic environment; further explore methods for reducting transportation noise by analyzing their effectiveness, impact on system performance, cost, feasibility, and economic desirability; provide urban planners, transportation system planners and operators, acousticians, governmental agencies and others with better measures of the community cost of transportation noise, and with better techniques for noise alleviation.

Resources Estimate, Funds: $125,466

Security of Report: Unclassified.

Procurement Method: Contract.

30 April 1970

DOT-OS-00006

Start Date: 8 10 69

Estimated Completion Date: ~~30-06-70~~ 31 12 70

Kind of Report: New

Performing Organization, Name: National Science Foundation
1800 G Street, N.W.
Washington, D.C. 20550

Principal Investigator, Name: Wallace Waterfall, Treasurer
Acoustical Society of America

Responsible Government Organization, Name: Department of Transportation
Assistant Secretary
for Systems Development and Technology
Office of Noise Abatement
800 Independence Avenue, SW
Washington, D.C. 20590

Responsible Government Individual, Name: Robert L. Paullin
Regulatory Policy and Standards Div.
Office of Noise Abatement

Key Words: Research in noise standards

Title: Formulation of Noise Standards

Summary: Support the continuation of work by the Acoustical Society of America dealing with the formulation of acoustical standards. The three standards committees of the Acoustical Society (S-1 - Acoustics, S-2 - Shock and Vibration, and S-3 - Bioacoustics) will report upon current engineering and scientific research designed to provide technical bases for specifying standard methods for the measurement of noise and vibration and defining acceptable limits for noise and vibration by transportation equipment.

Resources Estimate, Funds: $21,400

Security of Report: Unclassified

Procurement Method: Interagency Agreement

~~17 April 1970~~
Updated September 1970

DOT-AS-00014

Start Date: 15 10 69

Estimated Completion Date: 07 70

Kind of Report: New

Performing Organization, Name: U.S. Department of Commerce
National Bureau of Standards
Washington, D.C.

Principal Investigator, Name: Paul J. Brown
Chief, Office of Vehicle Systems Research
Institute for Applied Technology, NBS

Responsible Government Organization, Name: Department of Transportation
Assistant Secretary
for Systems Development and Technology
Office of Noise Abatement
800 Independence Ave., S.W.
Washington, D.C. 20590

Responsible Government Individual, Name: ~~John G. Courlas~~ W. Harry Close
Research Division
Office of Noise Abatement

Key Words: Study of tire sound generation

Title: Tire Acoustics Program

Summary: Determine through a study of tire sound generation whether the variations between tires can lead to an effective acoustical grading of tires. The two distinct areas of investigation are: a) the physical distribution and characteristics of the sound generated by a representative range of commercial tires under various conditions; and b) a comparative assessment of the auditory responses to typical noises generated by tires. -- The use of NBS facilities and expertise may provide an inhouse capability for measuring tire noise that could lead to a federal rating system or a regulatory procedure for limiting tire noise generation.

Resources Estimate, Funds: $50,000

Security of Report: Unclassified.

Procurement Method: Reimbursable Agreement.

Draft report received.

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[illegible] operations. [illegible] noise abatement and pollution control.

The efforts in reducing noise that must are broad in scope and include research on the major sources of noise—surface and air transportation. Emphasis in noise reduction is directed toward such areas as trucks and truck tires, rail, and construction equipment. Basic research is being continued on aircraft, including the STOL and V/STOL types. The eventual [illegible] of these types of aircraft will depend greatly on their compatibility with the environment.

Pollution has been amply demonstrated to possess serious ecological [illegible] unless it is controlled. The research planned in pollution control is designed to provide stimulation of U. S. industry and to produce effective controls for their products. The area of aviation exhaust emissions continues to require basic inquiry. This is particularly true in the case of the effects of worldwide SST operations on the upper atmosphere. In addition, the effect of pollution controls imposed on the transportation industry will be examined.

1. NOISE ABATEMENT .... ~~$1,[illegible]~~ 5745
(Transportation Systems Center) .... ($1,[illegible]) (900)

[illegible] research into the sources, effects, and propagation of transportation noise (surface as well as air); selective experimentation with and demonstrations of noise reduction techniques; and research in support of the Interagency Aircraft Noise Abatement Program (IANAP). Major emphasis is directed toward the demonstration of practical applications of noise reduction techniques to existing transportation vehicles and the development of research capabilities to provide the basis for solution of problems into the future.

a. Surface Transportation Vehicle Noise Reduction $450

This program is composed of projects intended to demonstrate economic methods of abating noise generated by existing transportation vehicles. Contracts will be entered into with acoustic research firms and/or manufacturers and operators of transportation vehicles to develop and demonstrate modifications to vehicles which incorporate recent state-of-the-art noise reduction techniques. These projects will demonstrate noise reduction in truck engines, truck tires, construction equipment, and mass transit rail vehicles.

b. Right-of-Way (Guideway) Noise Reduction $100

This program is [illegible] and technologically feasible methods of attenuating noise transmissions generated by vehicles operating on highways and/or other guideways. Noise

($ in 000)

enforcement problems encountered by state and local authorities will also be examined to determine areas of possible refinement and innovative methods of noise measurement. The proposed work will demonstrate improved noise barrier design and noise enforcement measurement techniques.

c. Research on Noise Generation Mechanisms $450

This program will enhance the basic knowledge needed for further understanding of fundamental noise generation and propagation associated with jet noise, V/STOL noise sources, and internal combustion engine noise. The program will be supported both by grants to appropriate universities and the development of an in-house capability at the Transportation Systems Center.

d. Noise Measurement, Analysis, and Information $500

This program will provide further refinement of techniques used to measure transportation systems noise in metropolitan areas. It will further provide additional in-depth analyses and refinement to mathematical models previously developed to assist transportation system planners and operators. It will also provide incremental support of a sophisticated noise information retrieval and storage system.

e. Airport Noise Reduction Program $8,245 4245

In the absence of additional advanced noise reduction devices and techniques, current and future aircraft will produce excessive airport noise. In order to enhance compatability between the airplane and its airport

($ in 000)

neighbors, the research and technology program for reducing airport noise must be moved forward with all deliberate urgency. Several promising methods of abating noise will be pursued vigorously. If possible, innovative methods will be developed and tested to complement or replace known technology. This work will be entirely complementary to Federal Aircraft Noise Abatement programs.

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(1) Exhaust Noise Suppressor ~~$5,745~~ 3,000

In order to provide significant noise suppression for current and future aircraft, suppression devices must be developed that have the potential of substantial jet noise reduction. To achieve this degree of engine exhaust noise suppression, the feasibility of developing efficient multi-tube nozzle/lined ejector noise suppressors must be investigated. This program will include development of theory and empirical data for this type of noise control through analyses and tests of: tube size, shape, spacing, number and length, cooling methods, and material development. Variables of ejector design, such as area ratio, length, and acoustic lining properties, will also be analyzed. This work will be initiated with scale model suppressor development, but will lead to full-scale demonstrations.

(2) Structure and Turbulence Investigations and Related Demonstrations ~~$2,500~~ 1,245

Theoretical and experimental studies will be initiated to determine the overall structure, turbulence levels, and noise source distribution in jet flows to gain a more complete understanding of the mechanisms by which noise is generated. Without such understanding, noise reduction must be pursued using purely empirical approaches to suppression and engine cycle changes. This effort will involve laboratory and scale model research.

b. Environmental Quality Program (Noise Suppression, Sonic Boom, and Aircraft Emission)................ $3,500,000

The objectives of these programs are to: (1) alleviate the aircraft noise problem; (2) reduce the intensity and adverse effects of the sonic boom phenomena; and (3) mitigate the effect of aircraft emissions on the environment. Efforts to be accomplished are:

(1) Noise Suppression, $1,850,000

(a) Source, $900,000

The work will involve investigations into the parameters that cause or influence the actual generation of noise emanating from aircraft, plus development of guidelines for changes to the engine hardware to minimize this noise. In addition, the effort will include development of equipment or devices necessary to be installed, attached, or actually built into engines of various designs to suppress that noise which is generated. Included are studies to improve techniques of noise measurement, data reduction and analysis, plus refinement of yardsticks for evaluation and rating of various levels of aircraft noise.

(b) Transmission Paths, $150,000

This program concerns itself with efforts to minimize the noise by proper consideration of the paths the noise takes to travel from its source to the receivers. The work will involve development of optimum safe operational procedures designed to minimize noise. The studies will cover the aircraft performance characteristics, the safety aspects of noise abatement procedures, as well as the noise exposure that results from various flight profiles and ground operations. Included are studies to improve techniques of noise measurement data reduction and analysis, plus refinements of the yardsticks used for evaluation and rating of various levels of aircraft noise.

(c) Receiver (Human Response), $250,000

This effort provides for the reduction, control, and evaluation of noise at the receiving end. The work will involve developing and refining acceptable yardsticks for evaluation and rating of various levels of aircraft noise, and the development of guidelines for planning for and control of the residual noise inherent in airplane operations.

(d) System Analysis, $550,000

This program involves a systematic study of all facets of the aircraft noise abatement program. Technical, economic, social, operational, and psychological aspects of the problem are quantified and/or qualified to be used as aids in making decisions. Costs and benefits of alternative solutions, certification standards, land use guidelines, operational standards, and abatement programs are defined and reduced according to a rationale established by analysis.

(2) Sonic Boom, $1,200,000

A sonic boom certification research program is needed both to develop technical and social criterion for sonic boom limits that must be established in accord with Public Law 90-411, and to form definitive guidelines upon which to base government and industry policies for the regulation of future supersonic or transonic commercial aircraft.

(a) Generation and Propagation, $600,000

This subprogram is concerned with the reduction and control of sonic boom by aerodynamic design and the investigation of parameters that influence shock wave generation and propagation.

(b) Human Response, $400,000

This work involves investigation into the psychological, physiological and sociological factors and the interaction between these as related to the effects of sonic boom upon people and communities.

(c) Animal Response, $75,000

The objective of this program is to determine short and long-range effects of sonic boom on wild and domestic birds and animals and aquatic life forms.

(d) Structural Response, $125,000

The effects of isolated and repeated sonic booms on structures including glass breakage will be investigated. Included in the program is the development of the special instrumentation and analysis methods required to properly evaluate response to sonic booms and superbooms.

(3) Aircraft Emissions, $450,000

(a) Transmission Paths, $300,000

This work includes investigation of the effect of engine emissions at altitude, engine emission dissipation rates under various meteorological conditions, and analysis of ground operations to determine possible procedural modifications to reduce pollution ascribable to aircraft and aircraft related activities.

(b) Receiver (Human, Animal, Ecological), $150,000

Investigations will be made under this subprogram on the effects of exposure of people to concentrations of aircraft engine emissions. Studies also will include the effect of various concentrations of such emissions and fall-out of particulate matter on property as well as on the ecology.

DEPARTMENT OF TRANSPORTATION

Federal Highway Administration

Active Studies '72

Study Title	Type	Current Funding
Field Evaluation of Traffic Noise Reduction Measurements	NCHRP	50K
Relating Highway Design and Environment to Abatement of Traffic Noise	HPR (Maryland)	42K*
Pollution of Michigan Urban Atmospheres by Highway Generated Noise	HPR (Michigan)	28K*
Community Noise Survey and Evaluation	Administrative	17K*
Traffic Noise Near Highways and the Effect of Design and Environmental Variables	HPR (California)	12K*

*Federal funding = 70%
State funding = 30%

DEPARTMENT OF TRANSPORTATION

Office of the Secretary
(Office of Noise Abatement)

Position Title	Series	Grade
Director	1301	17
Secretary	318	9
Chief, Plans & Programs Div.	2101	16
Program Analyst	345	14
Program Analyst	345	9
Chief, Regulatory Policy & Stds. Div.	1301	16
Operations Research Analyst	1515	15
Secretary	318	7
Chief, Research Division	801	16
Mechanical Engineer	830	15
General Engineer	801	15
Secretary	318	7

Federal Aviation Administration
Systems Research and Development Service
(Noise Abatement Division)

Position Title	Series	Grade
Chief	861	16
Secretary	318	7
Program Analyst	345	14
Chief, Aircraft Noise Branch	861	16
Aerospace Engineer	861	15
Aerospace Engineer	861	15
Aerospace Enginer	861	14
Chief, Sonic Boom Branch	861	16
Psychologist	180	15

Transportation Systems Center
Mechanical Engineering Div.
(Electromechanical Branch)

Position Title	Series	Grade
Chief (detail from Coast Guard)		
Special Projects Officer	301	14
Mechanical Engineer	830	14
Mechanical Engineer	830	13
Electronics Engineer	855	13
Electronics Technician	856	11
Engineering Technician	802	11
Clerk-Steno	301	5

Federal Aviation Administration
Office of Environmental Quality

The authorized staffing for the FAA, Office of Environmental Quality includes 11 professionals and 1 military (Colonel) detail from the Department of Defense, responsibile for environmental research (noise and pollution). There are 3 - GS-16s; 7 - GS-15s; and 1 - GS-14. Disciplines represented in these positions are: systems analysis, technical environmental planning, environmental science, operations systems analysis, measurement and research planning.

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DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

WASHINGTON, D.C. 20590

7 SEP 1971

Dr. Alvin F. Meyer
Director, Office of Noise Abatement
and Control
Environmental Protection Agency
Washington, D. C. 20460

Dear Dr. Meyer:

The Office of Environmental Quality, within the Federal Aviation Administration, has just completed the execution of a noise reduction flight (operational) evaluation project. This project was performed at our National Aviation Facilities Experimental Center near Atlantic City, New Jersey, and constitutes but one of many projects this office has programmed and directed toward the control and abatement of aircraft noise.

The subject program objectives include the quantification of measured and recorded reduction in aircraft noise through the use of various operating procedures/techniques by the same aircraft. For a cross-reference on the impact of noise reduction by aircraft type design the same procedures were also evaluated for four different turbojet powered airplanes.

Enclosed for your review and consideration are the program's past and current progress reports (1-5). We intend to forward a copy of the final report when such is complete. If there is additional program information desired, please contact Mr. R. D. Shreve, EQ-20, Program Director.

We endorse and are looking forward to continued Federal coordination in the process of resolution to the nation's environmental problems.

Sincerely,

R. P. SKULLY
Director
Office of Environmental Quality

Enclosures

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

WASHINGTON, D.C. 20590

DATE: 19 August 1970

IN REPLY REFER TO: NO-1

SUBJECT: Operational/Procedural Noise Reduction Flight Program - Progress Report No. 1

TO: Deputy Administrator
Through: PL-1

A program has been developed for the flight evaluation and data analysis of potential noise reduction, specifically during the approach to landing flight phase, associated with:

1. Configuration change (airframe/thrust)
2. Variable glide slope intercept altitude
3. Two-segment approach
4. Uniform (3°) vs variable glide slope angle

The flight program will be executed in such a manner so as to develop noise data which can be related to a base procedure/configuration, thus enabling an incremental or delta noise level to be identified with each of the profiles flown.

This flight program, by necessity, requires the cooperative and coordinated efforts of several Offices and Services within the agency. A task force made up of representatives from each of the Offices and Services involved has been formed to ensure effective coordination and expeditious completion of the program.

Under Secretary Beggs requested the program's schedule as soon as possible. It is anticipated that such a schedule will be available within two to three weeks. Virtually, all of the programs' variables have to be defined prior to establishing a schedule. The task force is currently working on this program phase.

While final results rather than progress reports are the program's objectives, it is suggested that such reports on the program's status can be helpful in identifying the program's achievements, program delays and, in many cases, resolve situations before they become program problems. With your concurrence, such reports will periodically be sent forth.

The Office of Noise Abatement's contact in regard to this program development is Mr. R.D. Shreve, NO-20.

JOHN O. POWERS
Acting Director, Office of Noise Abatement, NO-1

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

WASHINGTON, D.C. 20590

DATE: 7 October 1970

REPLY TO ATTN OF: NO-1

SUBJECT: Operational/Procedural Noise Reduction Flight Program - Progress Report No. 2

TO: Deputy Administrator O.K.
Through: PL-1

The development of the program's scope, coordination requirements and functional execution has been completed. In association with completing the developmental task, certain key program elements have been defined. Included are:

1. The flight phase will be executed on or about 5 April 1971. All contributing program components; i.e., site preparation, outside contractual support, rescheduling of FAA airplanes, etc., will be effected to ensure meeting the 5 April date.

2. NAFEC, Atlantic City, New Jersey, is the test site of prime consideration.

3. Takeoff profiles will be flight evaluated as well as and supplementary to the prime objectives of approach profiles relative to potential noise reduction.

4. The necessary funding for the program's execution, including all support components, will be allocated through reapportionment of the R&D budget in the FAA Office of Noise Abatement.

The decision to execute the flight phase during April 1971 was made in lieu of attempts to establish an earlier program execution (Fall of 1970) only after due consideration had been given to the practical analysis of the factors required for program implementation. Such factors included; (a) the possibility of inclement flight test weather anticipated for the late Fall or early Winter season; (b) minimum time required for site preparation and scheduling of on-site facilities; (c) sole source versus competitive bidding on required contractual support; and (d) conflicts created through the rescheduling of FAA airplanes, both for flight training and specified ground down time required.

Of the various test site locations given consideration, NAFEC with its in-house facilities, competent manpower and ground support equipment was selected as the most desired and advantageous site offering support to and compatibility with the objective requirements of this program.

The flight evaluation of various takeoff profiles has been included within the program's scope. While it is recognized that takeoff profiles have been evaluated in previous programs, the need for additional data acquisition exists. Industry has either proposed or is executing various takeoff profiles which tend to effect relief at a given point in the profile or are being adopted simply as company noise abatement procedures. Industry is to be commended for the initiative shown; however, this program will execute in summary these various profiles to a much expanded data base. The noise levels generated by these various profiles will be measured and analyzed out to a 10 mile point. Such evaluation will then include not only potential noise reduction close-in, but also downstream of the highly impacted area. As an example - such data would reveal the actual impact of the thrust cut versus no thrust cut as identified with the cross-over or tradeoff in the various profiles relative to the total noise exposure experience.

The program's task force is now in a position, relative to the key element decisions, to structure the required details of program implementation. In this regard, a task force meeting is called for Monday, October 12, 1970 at 9:30 a.m. in room 9C. The agenda for this meeting includes:

1. Final concurrence in the definition of the approach and takeoff flight profiles.

2. Initiation of airplane leasing arrangements.

3. Scheduling of installation for required operational flight equipment and rescheduling, where necessary, of flight training.

4. Scheduling of NAFEC facilities and site preparation.

5. Preparation of specific airplane flight performance values for both approach and takeoff operation.

6. Review of acoustic contractual support.

7. Open review of progress or problems, if any, associated with the April 1971 program execution.

Enclosed for the task force member's consideration and guidance are the program's scope, profiles, and scheduling. A concerned review of these enclosures will contribute to the resolution of the agenda items for the 12 October meeting.

Thank you for your continued cooperation.

John O Powers

JOHN O. POWERS
Acting Director, Office of Noise Abatement, NO-1

Enclosures

Enclosure #1

OPERATIONAL-PROCEDURAL NOISE REDUCTION FLIGHT PROGRAM

OBJECTIVES

TO IDENTIFY THE LEVELS OF NOISE REDUCTION OBTAINABLE THROUGH VARYING AIRCRAFT FLIGHT PATHS AND OPERATIONAL PROCEDURES IN THE TERMINAL AREAS.

SCOPE

VARIATIONS IN FLIGHT PATHS AND OPERATIONAL PROCEDURES FOR:

APPROACH-TO-LAND

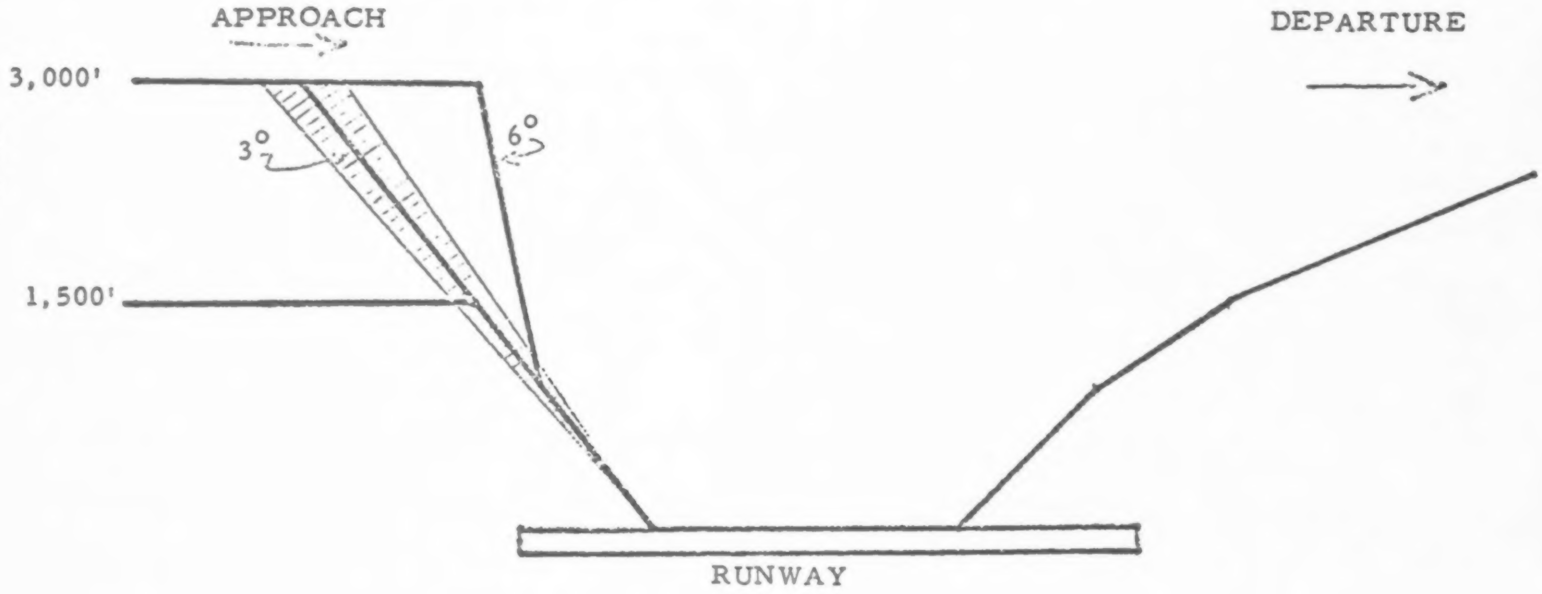
1. CONFIGURATION CHANGES (AIRFRAME/THRUST)
2. DIFFERENT GLIDE SLOPE INTERCEPT ALTITUDES
3. TWO-SEGMENT APPROACH, AND -
4. UNIFORM (3°) VS OTHER GLIDE SLOPE ANGLES

DEPARTURE

1. CLIMB OUT SPEEDS
2. CLIMB OUT CONFIGURATIONS (AIRFRAME)
3. THRUST REDUCTION, AND -
4. ALTITUDES FOR THRUST REDUCTION

Enclosure #2

PROGRAM PROFILES


APPROACH
DEPARTURE
3,000'
1,500'
3°
6°
RUNWAY

KEY VARIABLES - SPEED, THRUST/THRUST CUT, CONFIGURATION

Enclosure #3

ELEMENTS OF PROGRAM DEVELOPMENT

1. SITE SELECTION
2. "OUTSIDE" CONTRACTUAL SUPPORT
3. COORDINATION OF AGENCY OFFICE AND SERVICE FUNCTIONS
4. FLIGHT SCHEDULING.

Enclosure #4

PROGRAM FLIGHT SCHEDULE

AIRPLANES TO BE USED:

1. B-727 (FAA)
2. DC-9 (FAA)
3. B-720 (FAA)
4. B-707-320B (LEASED)

FLIGHT TIME PER AIRCRAFT

APPROXIMATELY 20 HOURS (ONE WEEK

TOTAL EXECUTION PERIOD

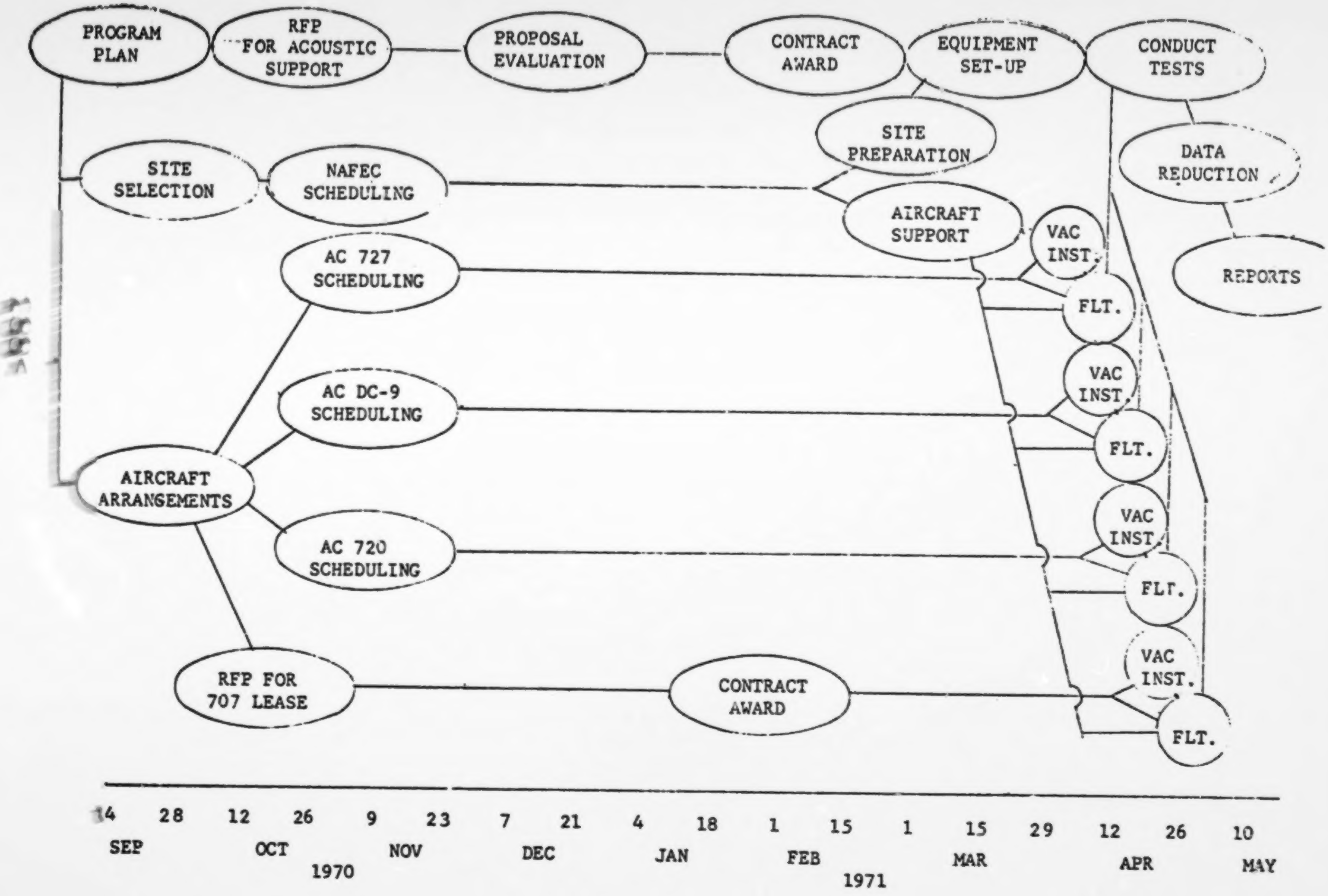
FOUR WEEKS

PROPOSED INITIATION AND EXECUTION DATES

APRIL 5,1971 THROUGH APRIL 30, 1971

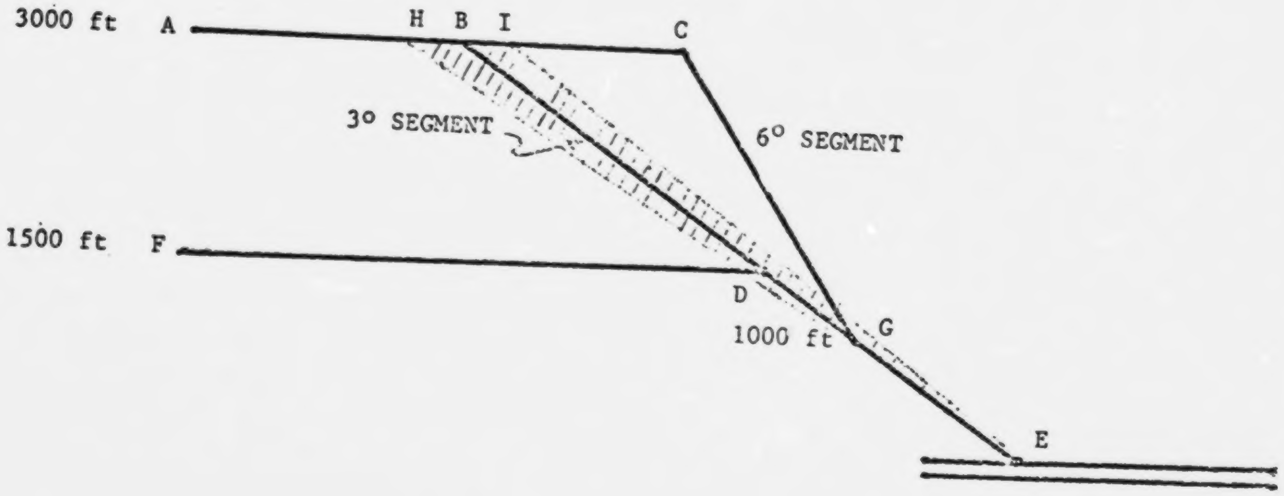
Enclosure #5

OPERATIONAL-PROCEDURAL NOISE REDUCTION FLIGHT PROGRAM


PROGRAM PLAN
RFP FOR ACOUSTIC SUPPORT
PROPOSAL EVALUATION
CONTRACT AWARD
EQUIPMENT SET-UP
CONDUCT TESTS
SITE PREPARATION
DATA REDUCTION
SITE SELECTION
NAFEC SCHEDULING
AIRCRAFT SUPPORT
VAC INST.
AC 727 SCHEDULING
FLT.
REPORTS
AC DC-9 SCHEDULING
VAC INST.
FLT.
AIRCRAFT ARRANGEMENTS
VAC INST.
AC 720 SCHEDULING
FLT.
VAC INST.
RFP FOR 707 LEASE
CONTRACT AWARD
FLT.
14 28 12 26 9 23 7 21 4 18 1 15 1 15 29 12 26 10
SEP
OCT
1970
NOV
DEC
JAN
FEB
1971
MAR
APR
MAY

Enclosu.e #6

APPROACH TO LANDING PROCEDURES
(MAXIMUM LANDING WEIGHT)


3000 ft
A
H
B
I
C
3° SEGMENT
6° SEGMENT
1500 ft
F
D
1000 ft
G
E

NOTE:

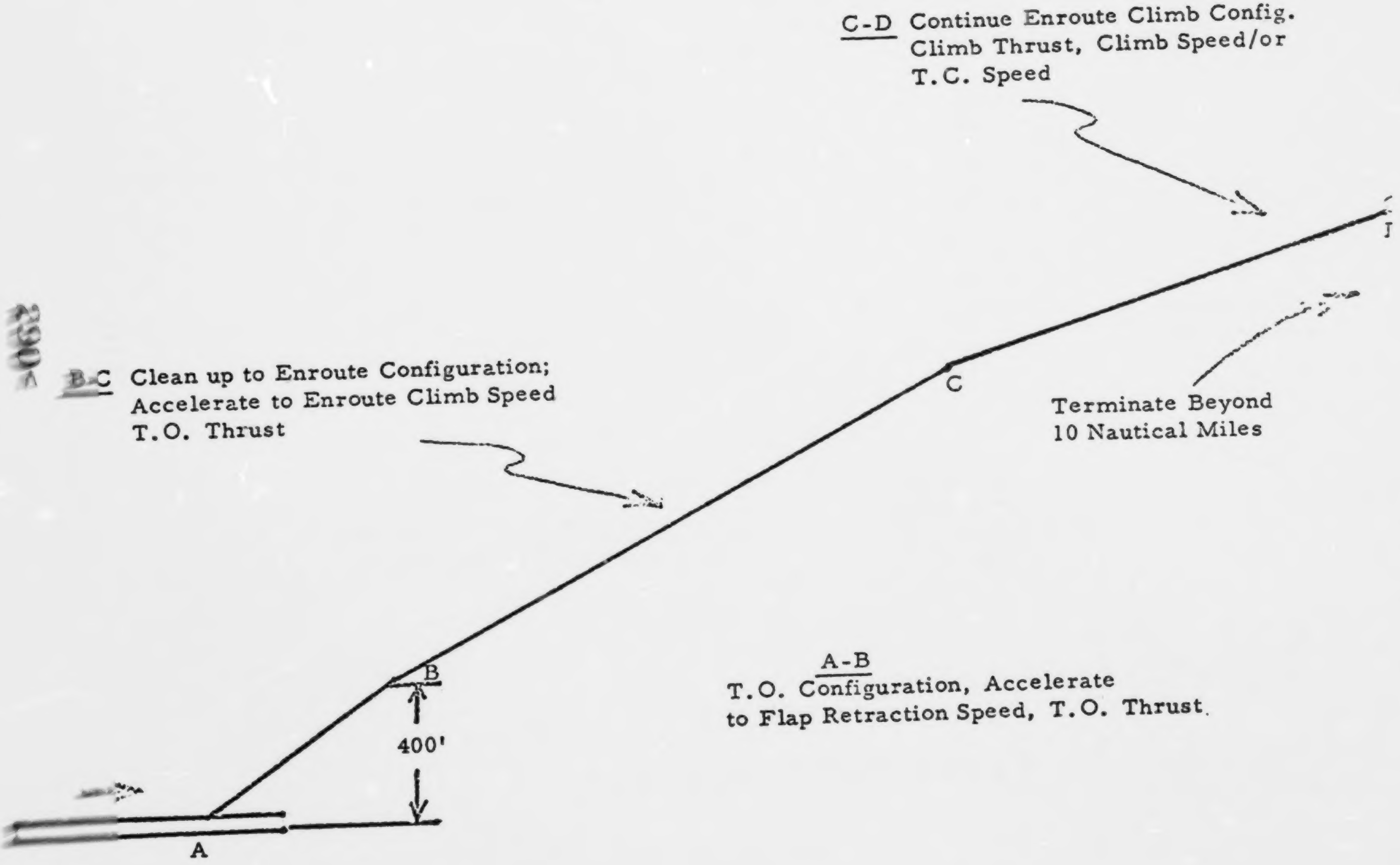
1. GEAR UP UNTIL REACHING B, C, OR D
2. APPROACH CONFIGURATION UNTIL REACHING B, C, OR D EXCEPT FOR CLEAN CONFIGURATION

PROFILE	CONFIGURATION			
	LAND. #2	LAND. #1	APPROACH	CLEAN
CONVENTIONAL (1500'-F-D-E)	X	X	X	
CONVENTIONAL (3000'-A-B-E)	X	X	X	X
TWO SEGMENT (A-C-G-E)	X			
HIGH GLIDE SLOPE (3000'-A-I-E)	X			
LOW GLIDE SLOPE (3000'-A-H-E)	X			

Enclos[illegible] #7

DEPARTURE PROCEDURE

NUMBER 1



C-D Continue Enroute Climb Config. Climb Thrust, Climb Speed/or T.C. Speed

B-C Clean up to Enroute Configuration; Accelerate to Enroute Climb Speed T.O. Thrust

Terminate Beyond 10 Nautical Miles

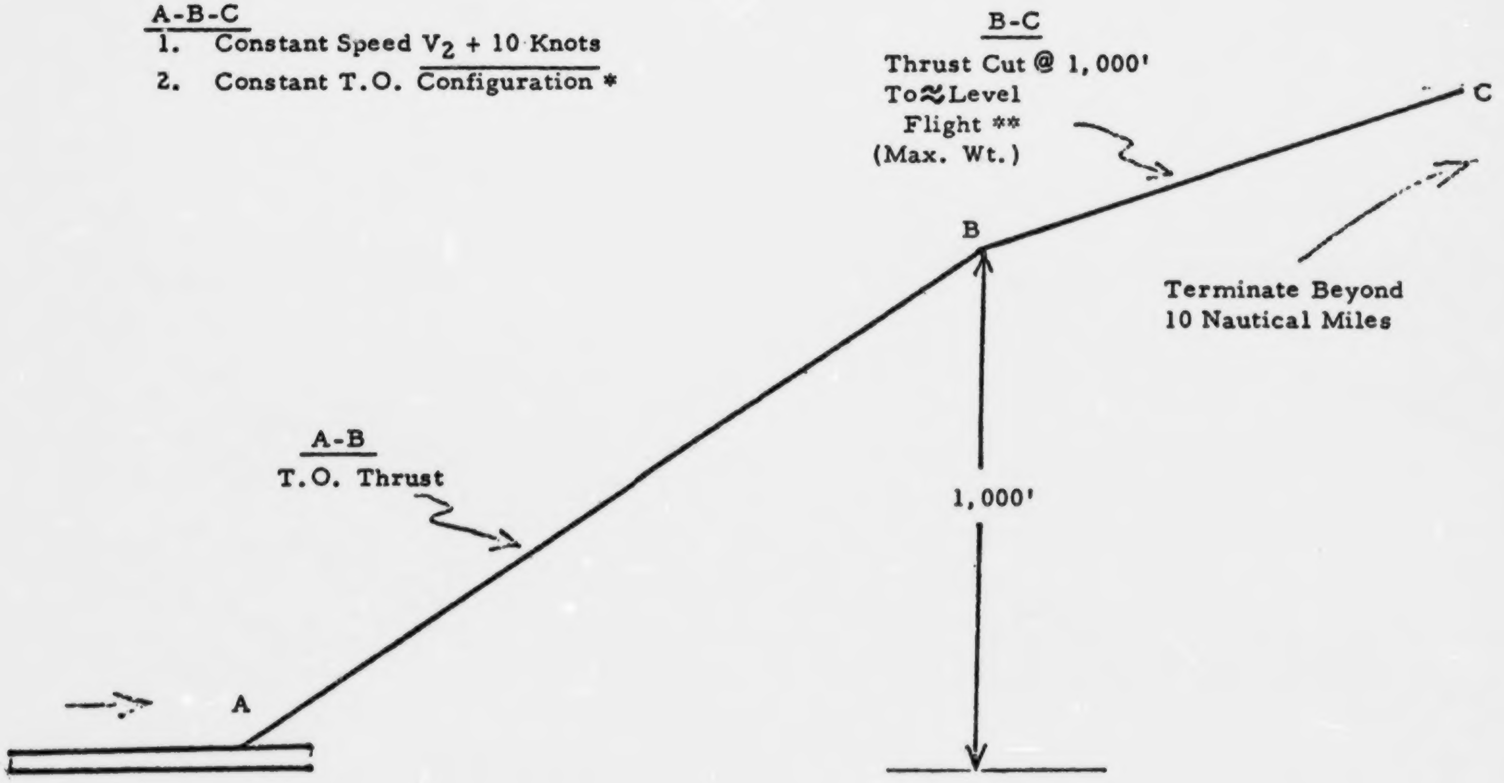
A-B
T.O. Configuration, Accelerate to Flap Retraction Speed, T.O. Thrust.

Enclosu: #8

DEPARTURE PROCEDURE

NUMBER 2

A-B-C
1. Constant Speed V_2 + 10 Knots
2. Constant T.O. Configuration *


B-C
Thrust Cut @ 1,000'
To ≈ Level
Flight **
(Max. Wt.)
C
B
Terminate Beyond
10 Nautical Miles
A-B
T.O. Thrust
1,000'
A

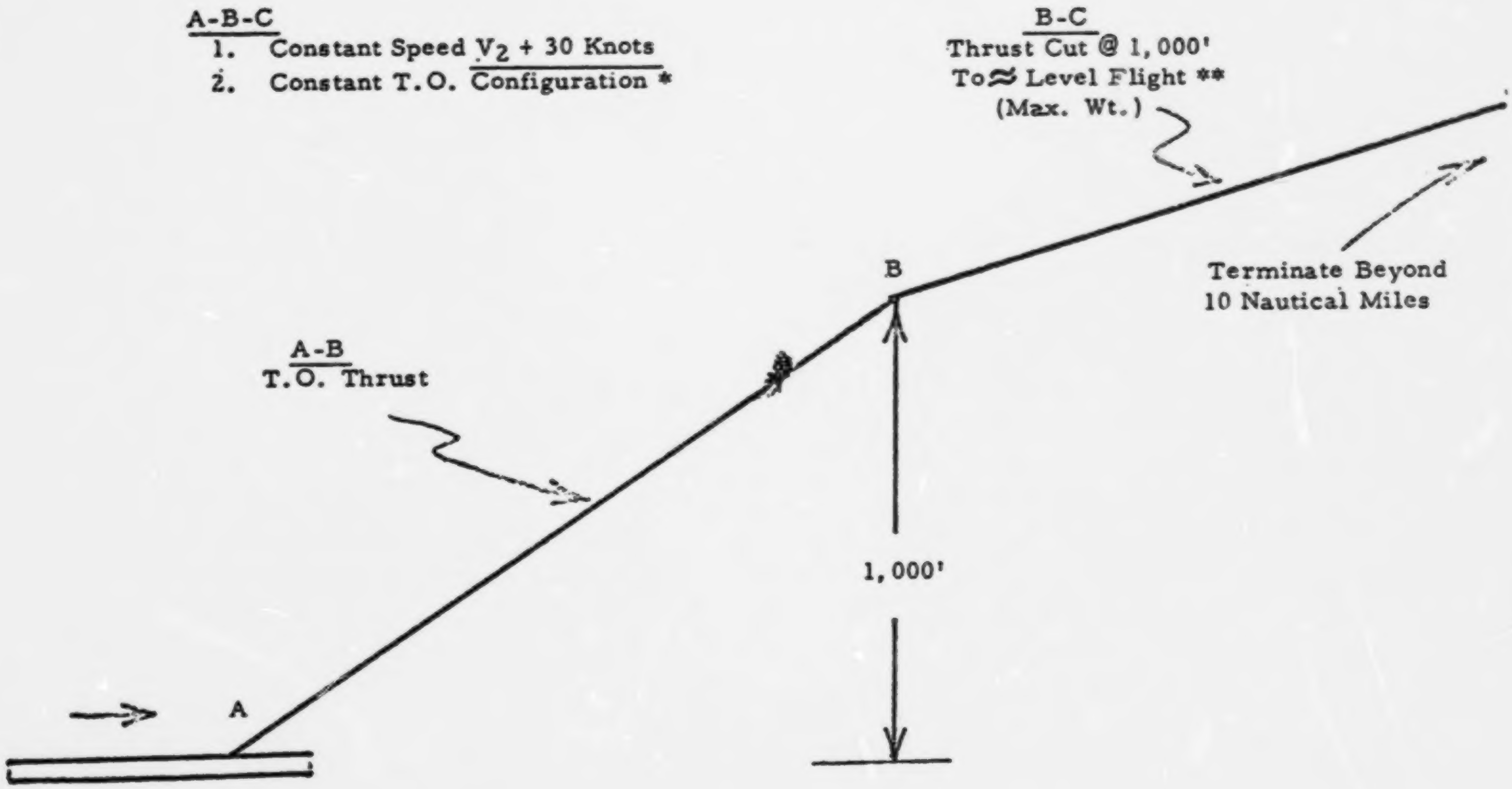
* Less Gear Retraction
** Engine Out Performance

Enclosure

DEPARTURE PROCEDURE

NUMBER 3

A-B-C
1. Constant Speed V_2 + 30 Knots
2. Constant T.O. Configuration *


B-C
Thrust Cut @ 1,000'
To ≈ Level Flight **
(Max. Wt.)
B
Terminate Beyond
10 Nautical Miles
A-B
T.O. Thrust
1,000'
A

* Less Gear Retraction
** Engine Out Performance

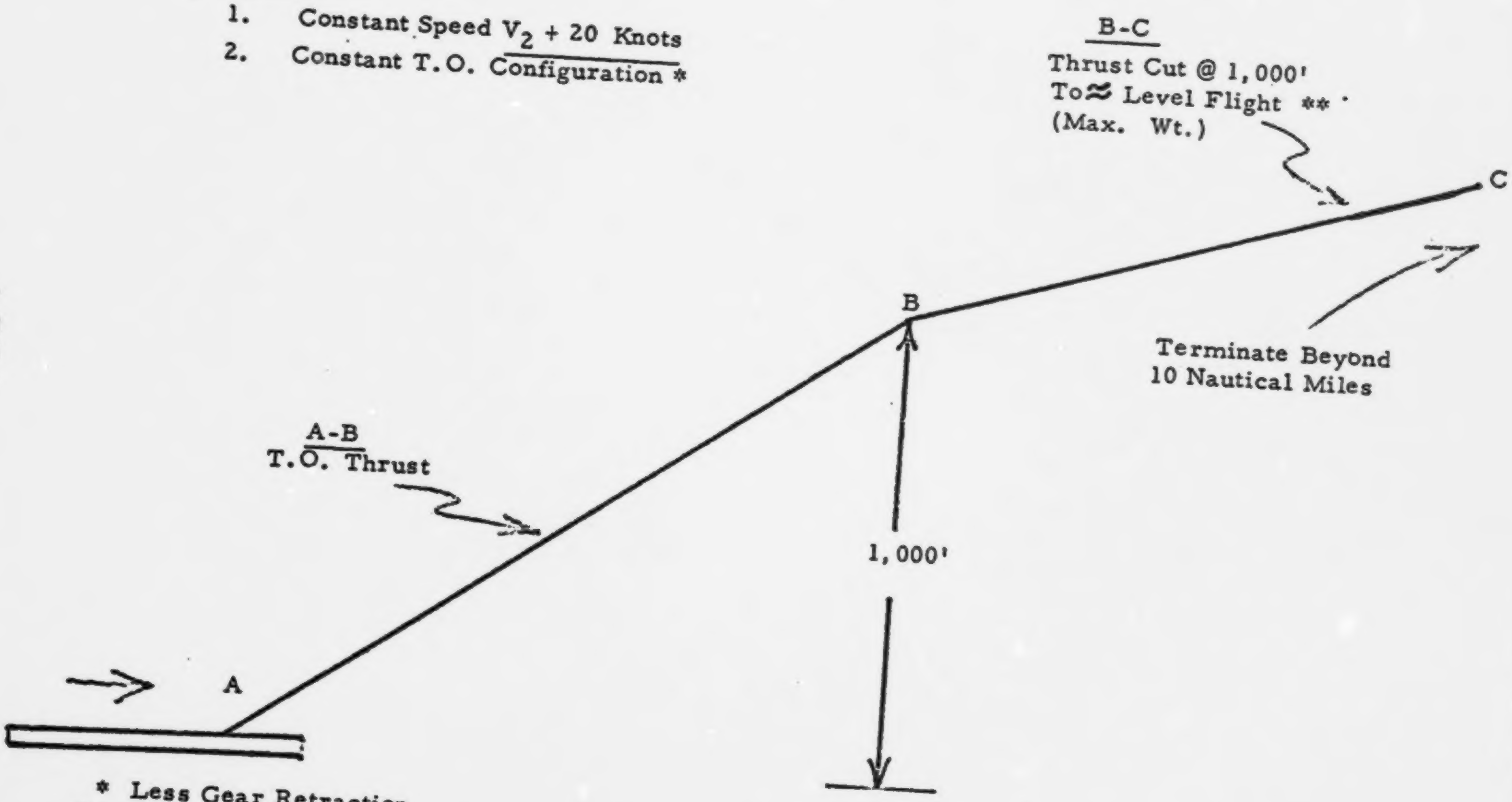
Enclosure #10

DEPARTURE PROCEDURE

NUMBER 4

A-B-C

1. Constant Speed $V_2 + 20$ Knots
2. Constant T.O. Configuration *

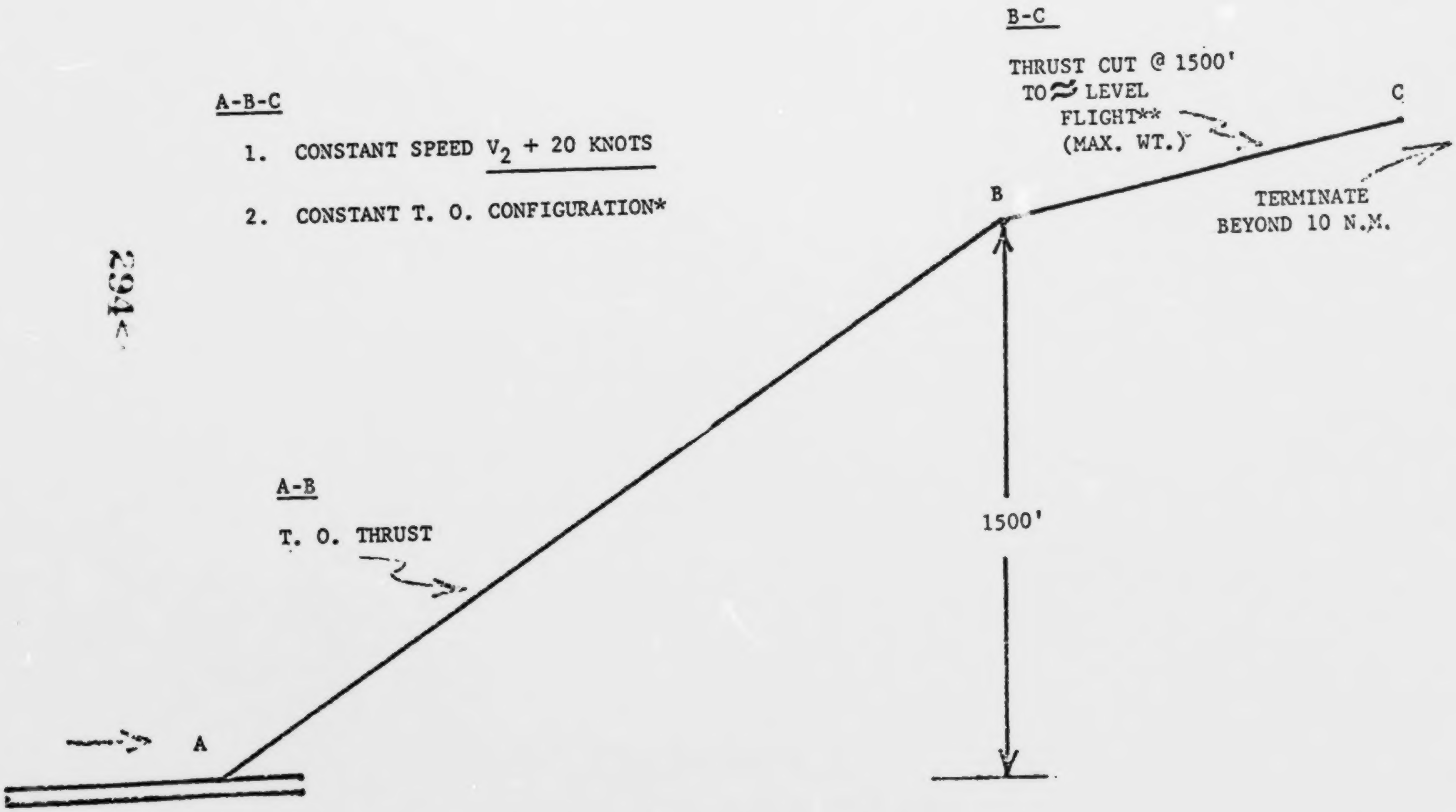

B-C
Thrust Cut @ 1,000'
To≈ Level Flight **
(Max. Wt.)
C
B
Terminate Beyond
10 Nautical Miles
A-B
T.O. Thrust
1,000'
A

* Less Gear Retraction

** Engine Out Performance

DEPARTURE PROCEDURE

NUMBER 5



A-B-C

1. CONSTANT SPEED V_2 + 20 KNOTS
2. CONSTANT T. O. CONFIGURATION*

A-B

T. O. THRUST

B-C

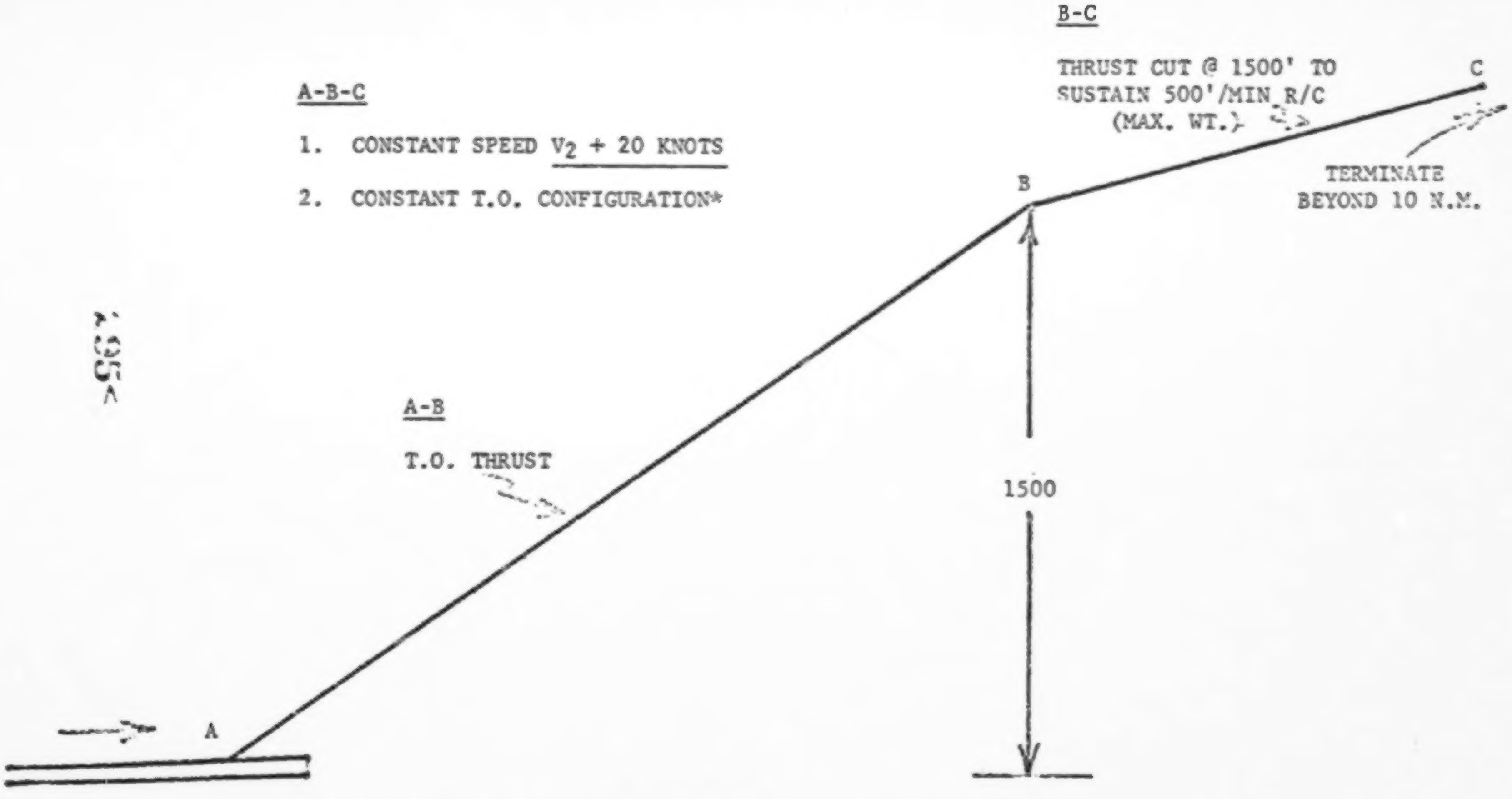
THRUST CUT @ 1500'
TO ≈ LEVEL
FLIGHT**
(MAX. WT.)

TERMINATE
BEYOND 10 N.M.

* LESS GEAR RETRACTION
** ENGINE OUT PERFORMANCE

DEPARTURE PROCEDURE

NUMBER 6


B-C
THRUST CUT @ 1500' TO
SUSTAIN 500'/MIN R/C
(MAX. WT.)
C
TERMINATE
BEYOND 10 N.M.
B
A-B
T.O. THRUST
1500
A

A-B-C

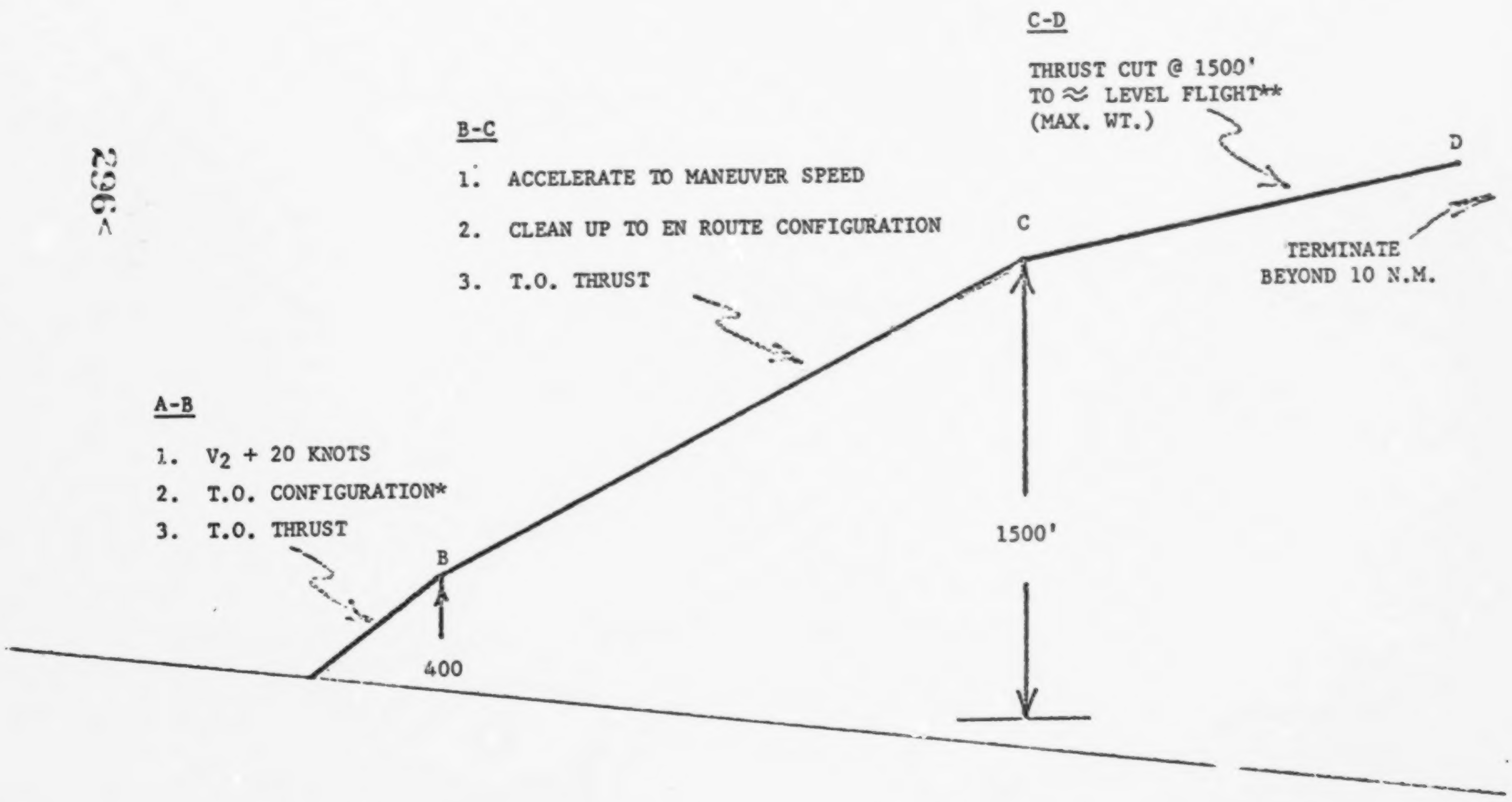
1. CONSTANT SPEED V_2 + 20 KNOTS
2. CONSTANT T.O. CONFIGURATION*

* LESS GEAR RETRACTION

Enclosure #.ↄ

DEPARTURE PROCEDURE

NUMBER 7



C-D

THRUST CUT @ 1500'
TO ≈ LEVEL FLIGHT**
(MAX. WT.)

B-C

1. ACCELERATE TO MANEUVER SPEED
2. CLEAN UP TO EN ROUTE CONFIGURATION
3. T.O. THRUST

A-B

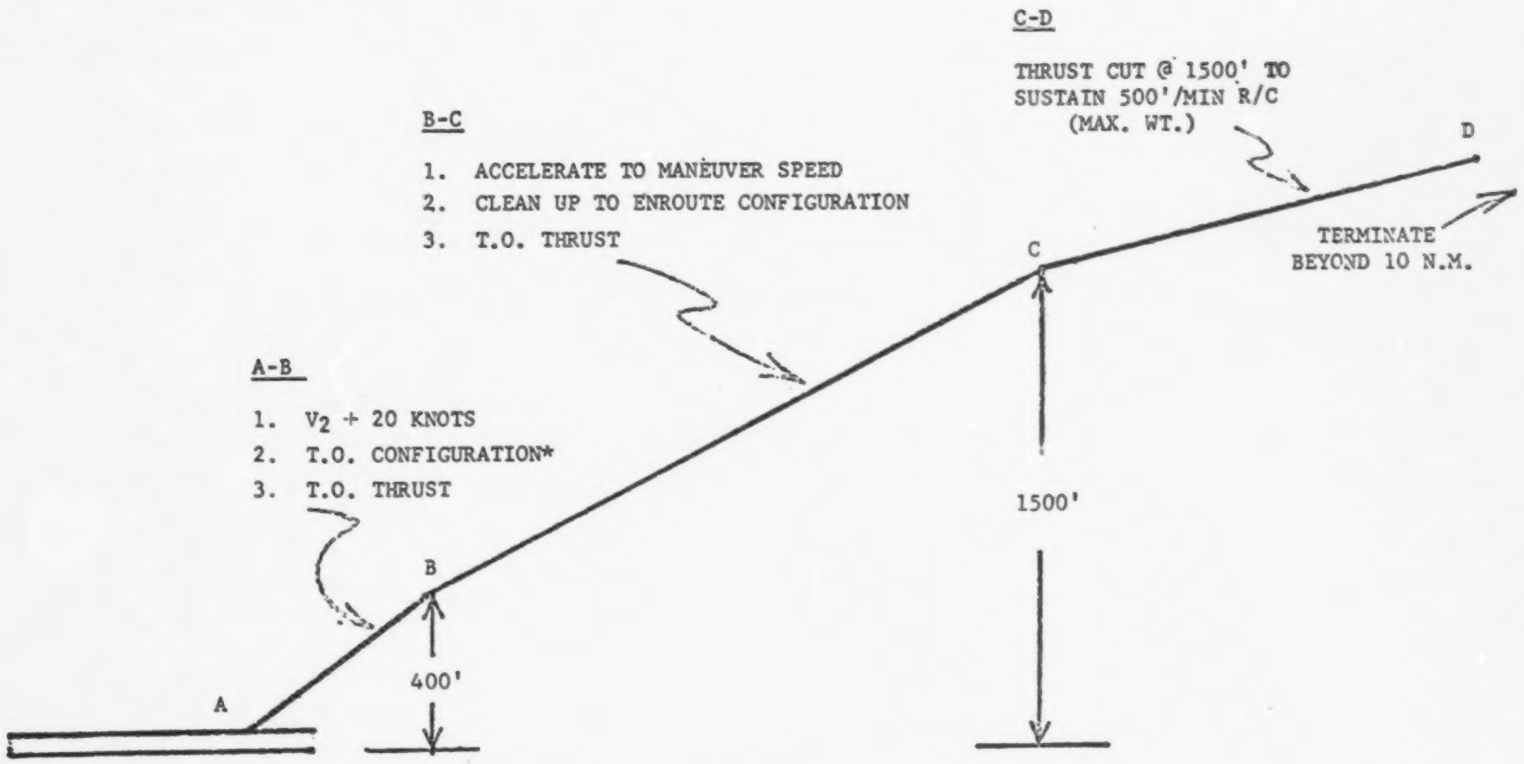
1. V_2 + 20 KNOTS
2. T.O. CONFIGURATION*
3. T.O. THRUST

D
C
B
TERMINATE
BEYOND 10 N.M.
1500'
400

Enclosure 4

DEPARTURE PROCEDURE

NUMBER 8


A
B
C
D
400'
1500'
TERMINATE
BEYOND 10 N.M.

A-B

1. V_2 + 20 KNOTS
2. T.O. CONFIGURATION*
3. T.O. THRUST

B-C

1. ACCELERATE TO MANEUVER SPEED
2. CLEAN UP TO ENROUTE CONFIGURATION
3. T.O. THRUST

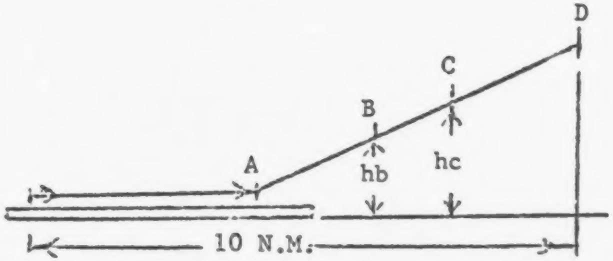
C-D

THRUST CUT @ 1500' TO
SUSTAIN 500'/MIN R/C
(MAX. WT.)

* LESS GEAR RETRACTION

Enclosure #15

TAKEOFF PROCEDURES



TAKEOFF		A-B	hb	B-C	hc	C-D
1	SPEED THRUST FLAP	→ FRS T.O. T.O.	400	→ ERCS (=) → ERCC	NA	ERCS → ERCT ERCC
2, 3, 4	SPEED THRUST FLAP	→ V_2+10, 20, 30 T.O. T.O.	1000 ⊛	V_2+10, 20, 30 → TSL (=)	NA	(=) (=) (=)
5, 6	SPEED THRUST FLAP	→ V_2+20 T.O. T.O.	1500	V_2+20 → TSL, T500 (=)	NA ⊛	(=) (=) (=)
7, 8	SPEED THRUST FLAP	→ V_2+20 T.O. → ERCC	400	→ VA (=) ERCC	1500	VA → TSL, T500 (=) ⊛

DEFINITIONS:

NA = Not applicable
TSL = Thrust level need for straight and level flight at max. gross weight one eng. out
T500 = Thrust level need for 500 FPM climb at max. gross weight one eng. out
ERC = En route climb

T = Thrust
S = Speed
C = Configuration
(=) = Same as preceding value
VA = Design maneuvering speed
FRS = Flap retract speed

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION
WASHINGTON, D.C. 20590

DATE: 5 FEB 1971

IN REPLY REFER TO: EQ-20

SUBJECT: Operational/Procedural Noise Reduction
Flight Program - Progress Report No. 3

TO: Deputy Administrator
Through: PL-1

The cooperation and coordinated efforts of the various Offices, Services and Facilities in fulfilling their responsibilities (described in the enclosure) toward the execution of this program has, to date, been outstanding. While certain problems have arisen, the willingness displayed in their coordinated resolution is more than worthy of specific mention. Sincere appreciation is expressed to each task force member for their obvious motivation and unqualified desire to ensure a successful program.

At this point, the development of key program elements seems to be on or ahead of schedule. Specifically:

1. The RFP for acoustical contract support has been issued, responses have been evaluated and currently final negotiations are in process with the acceptable bidders,

2. The RFP for lease arrangements of a B-707-300 series airplane has been issued with respond and final contract anticipated soon,

3. Site leasing and preparation along with the scheduling of NAFEC support facilities has either been completed or is progressing with no apparent hitches,

4. The flight scheduling of the FAA and lease airplanes has been firmed up, and

5. Operational instrumentation required in the evaluation airplanes has either been scheduled or is installed.

The FAA Convair 880M will replace the heretofore scheduled Boeing B-720 airplane due to a conflict arising in the instrumentation and operational scheduling. This switch presents no problem to the program's objectives as they are both turbojet four-engined airplanes.

There have been some changes and additions to the program's task force membership, as follows:

1. Mr. Jack Burke replacing Mr. D. G. Cockran from Airports Service (AS-560),
2. Lt. Colonel R. Chubbay replacing Lt. Colonel T. R. Howell from Systems Research and Development Service (RD-740),
3. The addition of Mr. Hugh Riddle from the Bureau of National Capital Airports (CA-5),
4. The addition of Mr. Harry R. Jackson from the Measurement Branch, Technical Facilities Division of NAFEC (NA-141), and
5. From the Department's Office of Noise Abatement, in addition to Mr. Charles H. Williams, the program now has Dr. Gordan Banerian (TST-50).

The program's definition and development has and will continue to be enhanced by these new task force members and the functions they represent.

In support of the program's objectives, arrangements are in process to obtain stock footage film of the events and the methods and facilities used in their development. With such stock footage, it is anticipated that at a later date, subject to the Administrator's approval, an operational movie could be developed. The intent of such a movie would be to document both through "sight and sound" the potential reduction in airplane noise exposure through operational techniques. It is believed that the information contained in such a movie would be of great benefit to the local authorities (airport-communities) when reviewed in light of seeking operational noise reduction in their own local noise sensitive areas.

A meeting is planned for the latter part of February with interested industry and civic groups for the purpose of reviewing with them the scope and objectives of this program. Particularly, the flight profiles will be discussed. It is planned to invite comments on the proposed profiles and where reasonable and practical, if offered, adjust the departure profiles to those, by consensus of the task force members, most meaningful for evaluation. Participants of the meeting will be invited to send representatives to observe the flight evaluation itself, especially industry pilot representatives will be encouraged to observe. The task force members will be informed of the exact date, time and place soon.

John O Powers

JOHN O. POWERS, Acting Director
Office of Environmental Quality, EQ-1

Enclosure

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION
WASHINGTON, D.C. 20590

DATE: 16 DEC 1970

IN REPLY REFER TO: NO-20

SUBJECT: Office/Service Responsibilities, RE: Operational/Procedural
Noise Reduction Program

TO: Program Task Force Members

Through the combined efforts of the task force with support from the Under Secretary and Administrator, the subject program has been outlined and scheduled. Sincere appreciation is expressed for the unqualified support given in obtaining this phase of program development. With this phase accomplished, it is essential to the success of the program's execution that each Office and/or Service, by way of their task force representative, recognize and fulfill their program support responsibilities.

The purpose of this memorandum is to assemble in one document the responsibilities of each Office/Service as defined in previous task force coordination meetings. The fulfillment of these responsibilities, in many instances, will require close coordination with other Office/Services. Thus, included with the listing of responsibilities are areas considered as those of prime coordination; accepting, that general coordination is required and anticipated within the working structure of the program's task force.

The following items are defined as Key, but not to be considered total, program support responsibilities for each of the contributing Office/Service functions:

FLIGHT STANDARDS SERVICE (Thru FS-403)

1. The leasing of out-of-agency airplane (B-707, 320 B/C). Such leasing arrangements should include -
    a. Consecutive calendar time of three (3) weeks
    b. Optional flight hours to be flown
    c. Lease crew and required airplane logistics
    d. Installation and post evaluation removal of required equipment and instrumentation.

2. Scheduling of FAA airplanes (DC-9, B-720 and B-727)

   a. Pre-evaluation ground time for those airplanes requiring equipment and instrumentation installation, and -

   b. Airplane(s) at test site for not only program flight evaluation but also for pre-evaluation profile proficiency flights.

3. Arrange for required equipment and instrumentation for segmented approaches, including manpower required for such installation.

4. The assignment of FAA evaluation pilots for each of the airplanes in the program, with support crews for the FAA airplanes.

5. Establish for all of the evaluation airplanes for each of the approach-to-land and departure profiles to be executed -

   a. Thrust and performance values to be used, noting operational limitations, - if such exist.

   b. Airframe configurations, and

   c. Flight deck procedures

6. Develop and submit a summary report, following the flight evaluation, concerning the pilots analysis of each profile flown relative to normal procedures, as to;

   a. Pilot workload relative to operations in low and high density terminal areas,

   b. Additional flight training requirements

   c. Compatibility of procedure under all weather flight conditions (VFR, IFR, etc.), and

   d. Other reviews or comments

COORDINATION

NO-20, FS-700, FS-100, NAFEC, AND AERONAUTICAL CENTER

AIRPORTS SERVICE (Thru AS-500)

1. Advise in the development of the program profiles,

2. Assist and monitor the program's execution,

3. Develop and submit a summary report, following the flight evaluation, concerning the potential use of such flight procedures-profiles within the airport system.

4. Act as the program's central information data release and retrieval source for regional coordination.

COORDINATION

NO-20, AT, FS, AND REGIONAL OFFICES

AIR TRAFFIC SERVICE (Thru AT-320)

1. Continue to advise and aid in the construction of the program's development,

2. Assist and monitor the program's execution,

3. Identify the known or potential impact of implementing operational procedural - flight profile modifications on the air traffic control system. Specific reference should be made regarding:

   a. Raising the glide slope intercept altitude to 3000 feet,

   b. establishing a uniform glide slope of 3 degrees.

Note: Such identification should include current and future facilities and equipment.

4. Develop and submit a summary report, based on the flight evaluation, concerning ATS analysis of implementing any such change in procedures or profiles (using specific airports as examples).

COORDINATION

NO-20, AS, AND FS

SYSTEMS RESEARCH AND DEVELOPMENT SERVICE (Thru RD-14[illegible])

1. Assist in procuring and making available, as per schedule, the agency developed equipment (selectable glide slope computer) for installation, as required, in the program's evaluation airplanes.

2. Prepare all necessary briefing material required to implement the functional operation of such equipment, and

3. Assign qualified personnel(s) for:

   a. The flight deck and operational check out of the installed equipment.

   b. Crew briefing on equipment, use and limitations, and

   c. Continuing surveillance of installed equipment during the flight evaluation execution, to ensure functional and reliable operation.

COORDINATION

NO-20, FS, AERONAUTICAL CENTER, AND NAFEC

NATIONAL AVIATION FACILITIES AND EXPERIMENTAL CENTER (Thru NA-141)

1. Acoustical measuring range site preparation, to include:

   a. off airport land leasing

   b. off airport land clearing

   c. surveying, and

   d. security surveillance at monitoring locations.

2. Availability and functional use of the Phototheodolite System to include, tracking plots, digitalized tapes of tracking, time synchronization, etc.

3. Supply and maintain communication network for central acoustic station, ground to air, ground to ground, control tower, etc.

4. Supply and maintain required ground support equipment to include vehicles, power units, etc.

5. Supply and operate land camera equipment, - minimum of two units.

6. Schedule and maintain control usage of the flight range and runway during the program's daily flight execution periods.

7. Logistics support for airplanes operational requirements, fuel etc.

8. Assignment and scheduling for manpower for the installation and maintenance of the evaluation airplane(s) operational equipment and instrumentation (SGSC).

9. The acquisition of the required meterological data

COORDINATION

NO-20, NO-10, FS, AND AERONAUTICAL CENTER

BUREAU OF NATIONAL CAPITAL AIRPORTS (Thru CA-5)

1. Participate and advise in the practical aspects and definition of the program's objectives, and

2. Evaluate and report on the program's execution as to the potential modification of existing procedural and flight profiles; wherein, such modifications would produce benefits/disbenefits to the airports operation and community relief.

COORDINATION

NO-20, AT, AND AS

OFFICE OF NOISE ABATEMENT (Thru NO-10)

1. Define the program's acoustical objectives and direct the

attainment of all acoustical data required to fulfill these objectives,

2. The procurement of required out-of-agency acoustical contracts; covering, —
    - a. Acoustical measuring equipment
    - b. Acoustical data acquisition
    - c. Acoustical data reduction
    - d. Preparation and submission of final data report
3. Assign an on-site acoustical project coordinator to direct and monitor all acoustical aspects of the program's requirement.
4. Develop, if required, additional use and presentation of the contractor's final data report,
5. Final approval in the selection and preparation of the acoustical range monitoring sites
6. Develop and outline the program's weather data acquisition requirements.

COORDINATION

NO-20, ACOUSTICAL CONTRACTOR(S), AND NAFEC

OFFICE OF NOISE ABATEMENT (Thru NO-20)

1. Direct and coordinate the over-all program development and execution
2. Develop and submit a final program report to the Administrator on the results of the program, to include,
    - a. An analysis of the data obtained relative to the program's objective
    - b. Identify the benefits - disbenefits regarding noise reduction

through procedural/flight path modifications and their operational implementation, and

c. Recommendations as to agency action relative to over-all results of this program execution.

The above outline of Office/Service responsibilities to the program's development and execution is not suggested to be complete as to the definition and detail required for active fulfillment; this is properly left to the task force leadership in each function. However, to aid each task force representative in his respective action, a third task force meeting has been set for 10:00 a.m. on 12 January 1971 in FAA Conference Room 7A. During this 12 January meeting, using the above outline as guideline reference, each task force member is requested to present his plan of action including progress to date, future scheduling with anticipated workload completion dates, and identification to any conflicts or problems associated with the fulfillment of his program support.

Progress Report Number 2, dated 7 October 1970 contained, as an enclosure, tentative scheduling for the program's development and execution. While the over-all schedule had intentionally some flexibility the flight execution portion was considered relative firm. Since the issuance of this schedule FS has indicated that it would serve their support function better if the following changes were made in the airplane flight scheduling:

Week Of	Airplane
April 5, 1971	FAA B-727 or B-720
April 12, 1971	FAA B-727 or B-720
April 19, 1971	Leased B-707 -320B/C
April 26, 1971	FAA DC-9

The option of the FAA B-727 and/or B-720 during the first two weeks of flight evaluation is yet to be determined by FS as is not considered critical to the program's scheduling. However, for potential leasing or contractural reasons it is essential to establish a specific flight date for the B-707 -320B/C. The FAA DC-9 has earlier committments on the west coast, thus, should be and is scheduled last.

A revised flow chart of scheduling the program's development and execution will be developed and issued following the more specific dates presented for the various functions at the 12 January meeting.

Thank you for your past and anticipated continuing support to this program.

R. D. Shreve

R. D. SHREVE
Program Manager, NO-20

22 MAR 1971

EQ-20

Operational/Procedural Noise Reduction
Flight Program - Progress Report No. 4

Deputy Administrator
Through: ~~PL-1~~ RWP
3/31/71

On 26 February 1971, a meeting was held in Washington Headquarters with interested groups of the aviation industry and civic organizations for the purpose of coordination and review of the agency's subject program. Nine interested groups were represented by thirty-five attendees (see Enclosure 1 for listing of participants).

A detailed presentation was given of the basic subject program, plus mention of the recently added "fly-by" data acquisition schedule recommended by the Department. Much discussion evolved relating to the profiles and paths to be flown. Due to the varying suggestions of many participants, it was requested that formal recommendations be submitted to the program director within one week as to possible modification, deletions or additions of the profiles presented. The groups attending were invited to participate in the program, on-site, as observers and in the case of pilots as active evaluators.

The program's task force met 9 March 1971 to make final decisions on the flight paths and profiles to be evaluated. The resulting decisions were based on comments received and a redefinition of the profile requirements subject to the inclusion of "fly-by" data acquisition, now referred to as Phase II.

The approach-to-land profiles (Enclosure 2) have remained essentially the same in total number and definition. The "clean" configuration has been deleted as such serves little practicality in line operation and more importantly the noise level data from this configuration can now be obtained effectively from the fly-by runs. The departure profiles (Enclosure 3) have been reduced in number and refined somewhat to reflect the submitted comments, where appropriate, as well as final consensus of the task force members. The adjustments and/or reductions in either the approach-to-land or departure profiles will improve the program's definition and increase the value of its results.

As follow-on action to the statements in the OA-1/TST-1 memorandum of 23 February 1971, Enclosure 4, defines the purpose, objectives, airplane configuration-thrust and airframe, and run scheduling for the fly-by data acquisition. While the requirements of data acquisition for this addition to the basic program will increase the acoustical contract costs by some fifty per cent, and flight time by approximately thirty per cent, concurrence is given to the Department's recommendation, in that such efforts will produce needed and essential noise level information.

Progress Report No. 3 reported on a conflict in scheduling and availability of the agency's B-720 turbojet airplane to the program's needs. Immediate action was taken to substitute the agency CV-880 turbojet airplane, only to find precommitted scheduling would not permit such substitution. Currently, efforts are underway to resolve the conflict.

A detailed flight plan is currently being developed to include sequentially each event and all supporting requirements for the successful execution of the event. This flight plan is to be completed for task force review 23 March. Program personnel, along with representatives of the acoustical contractor, have made a preliminary survey of the test site including both the facilities and noise measuring site locations. No apparent major problems exist regarding the site at this time.

ORIGINAL SIGNED BY
JOHN O. POWERS

JOHN O. POWERS, Acting Director
Office of Environmental Quality, EQ-1

4 Enclosures

ENCLOSURE 1

FAA/INDUSTRY/CIVIC GROUP MEETING
OPERATIONAL/PROCEDURAL NOISE REDUCTION FLIGHT PROGRAM

26 February 1971

ATTENDEES

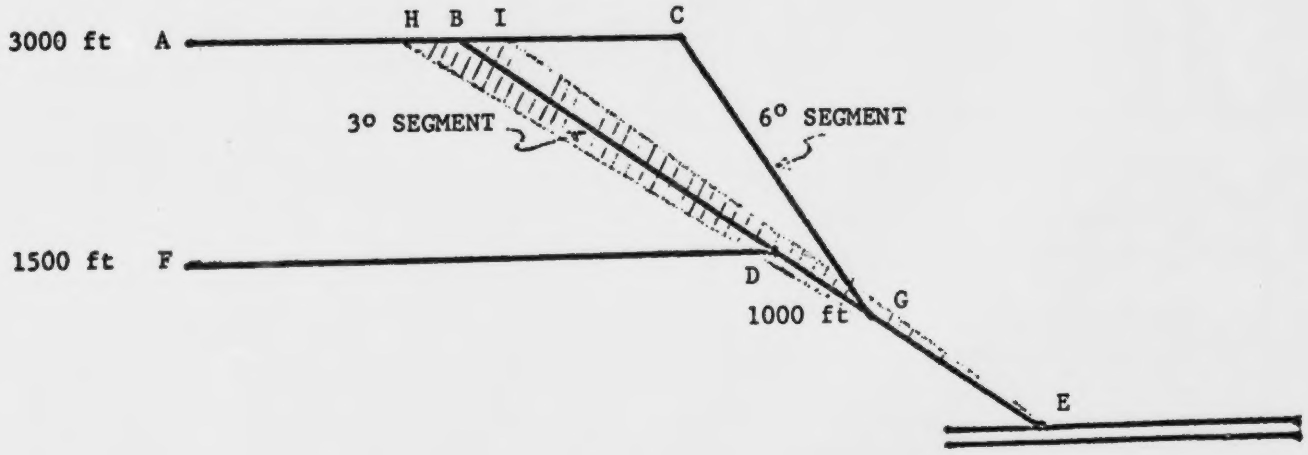
Represented	Representative
Airport Authority	Louis Achitoff (PONYA - New York) W. L. Cleveland (Dade County, Fla.)
Metropolitan Areas	D. N. Feinman (Atlanta, Georgia) J. J. Shelby (New York, New York) L. Hinton (Minneapolis-St. Paul, Minn.)
Airlines	Buck Schorr (Allegheny) Harvey Thompson (Allegheny) Paul A. Soderlind (Northwest) H. B. Benninghoff (American) Jack H. Graef (American) Robert A. Rogers (American) T. P. Ball (Delta)
Airport Operators Council International	Leo F. Duggan Jack Koepke
Airlines Transport Association of America	William B. Becker
National Business Aircraft Association	Larry Bedore
Air Line Pilots Association	Harold Marthinsen Ivan Reddington Andy D. Yates, Jr.
Federal Aviation Administration	Oscar Bakke J. O. Powers Hugh Riddle (CA) L. R. Merritt M. E. Russell

ATTENDEES (Con't)

Federal Aviation Administration	E. W. Sellman J. K. Power C. Morrow Harry Jackson (NAFEC) W. M. Frucht J. P. Mays R. A. Chubboy J. Cruz R. D. Shreve
Department of Transportation	C. H. Williams Gordon Banerian

ENCLOSURE 2

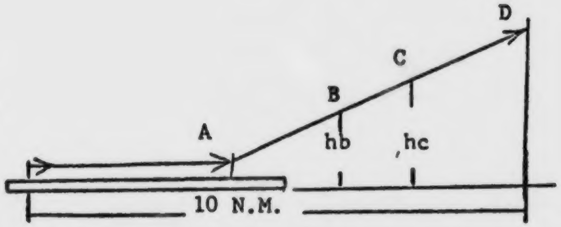
APPROACH TO LANDING PROCEDURES
(MAXIMUM LANDING WEIGHT)


3000 ft
A
H
B
I
C
3° SEGMENT
6° SEGMENT
1500 ft
F
D
G
1000 ft
E

PROFILE	CONFIGURATION		
	LAND. #2	LAND. #1	APPROACH
CONVENTIONAL (1500'-F-D-E)	X	X	X
CONVENTIONAL (3000'-A-B-E)	X	X	X
TWO SEGMENT (A-C-G-E)	X		
HIGH GLIDE SLOPE (3000'-A-I-E)	X		
LOW GLIDE SLOPE (3000'-A-H-E)	X		

NOTE:

1. GEAR UP AND APPROACH CONFIGURATION UNTIL REACHING B, C OR D.
2. SEGMENT F-D WILL BE FLOWN AT TWO APPROACH CONFIGURATION (50/50) TO BE SELECTED BY FS. ONE OF THESE WILL BE USED FOR COMPLIANCE WITH NOTE 1.



TAKE OFF WEIGHT			A-B	hb	B-C	hc	C-D	3000′
1	MAX LAND	SPEED THRUST FLAP	→ FRS T. O. T. O.	400±	→ 250K T. O. → CLEAN	NA	250K → ERCT CLEAN	NA
2	MAX T. O.	SPEED THRUST FLAP	→ FRS T. O. T. O.	400+	→ 250K T. O. → CLEAN	NA	250K → ERCT CLEAN	NA
3	MAX LAND	SPEED THRUST FLAP	→ V_2 + 10 T. O. T. O.	1000	(1) → V_{sf} T. O./EPR-1 → CLEAN	NA	V_{sf} EPR-1 CLEAN	→ 250K → CLIMB T. CLEAN
4	MAX	SPEED THRUST FLAP	→ V_2 + 20 T. O. T. O.	1000	V_2 + 20 → EPR-2 T. O.	NA	V_2 + 20 EPR-2 T. O.	NA
5	MAX LAND	SPEED THRUST FLAP	→ V_2 + 20 T. O. T. O.	1000	V_2 + 20 → EPR-1 T. O.	NA	V_2 + 20 EPR-1 T. O.	NA
6	MAX T. O.	SPEED THRUST FLAP	→ V_2 + 20 T. O. T. O.	1000	V_2 + 20 → EPR-1 T. O.	NA	V_2 + 20 EPR-1 T. O.	NA

NOTES AND DEFINITIONS

(1) Achieve acceleration by bringing pitch attitude for V_2 + 10 down to ½ that value +1 degree

EPR-1 = The EPR which gives as much thrust from all engines as would be necessary to maintain straight and level flight at max. takeoff weight with one engine out
EPR-2 = AN EPR setting intermediate between EPR-1 and T. O. settings
NA = Not applicable
FRS = Flap retract speed
T.O. = Takeoff setting
ERCT = Enroute Climb Thrust

OPERATIONAL/PROCEDURAL NOISE REDUCTION PROGRAM
PHASE II

Objective

The purpose of Phase II is to measure the sound propagation in the atmosphere and to conduct an investigation of aircraft sideline noise propagation. The Federal Aviation Administration (FAA) plans to catalog the noise signatures of the aircraft in situ for Phase I of the program. This data will be collected from flybys and the data will also be used to produce curves of Effective Perceived Noise Levels (EPNL) versus slant range. In this form it can be introduced into a computer program to obtain a Noise Exposure Forecast (NEF) for any airport if the flight paths and predicted traffic are available. These forecasts can then be used to predict levels of community reaction to aircraft noise and as a guide to land use planning. The sound propagation data will be used to resolve discrepancies in atmospheric absorption and propagation charts.

Proposed Course of Action

The objectives will be attained by analyzing acoustic data collected from a series of flybys at 4,000', 1,000', 500', and 250' above ground level. The runs will be as shown in Figure 1 from SW to NE over the centerline of runway 04 at NAFEC. Three power settings will be sufficient to give the required information--takeoff power, minimum power to maintain level flight at approach speed, and cutback power after takeoff (EPR for equivalent level flight with one engine out). Two measurement runs will be scheduled for the low altitude runs, three for the higher altitudes, if required.

Microphones will be located approximately 50' north of and parallel to runway 31 at the following distances from the centerline of runway 04: 125', 500', 1,500', 4,000', and 7,000'. Data will also be recorded from the microphone located one mile from the runway threshold. Level flight is desired for all runs. The aircraft will be in the takeoff configuration for those power settings associated with takeoff and in the landing configuration for the minimum power runs. The following table shows the altitude and power to be maintained throughout the run; i.e., from 2 n.m. DME to the field until 3 n.m. DME from the field.

Table I

Run #	Altitude (msl)	Thrust
1	4076'	100%
2	4076'	EPR for cutback
3	4076'	Level flt. min.
4	1076'	100%
5	1076'	Cutback

Table I (continued)

Run #	Altitude (msl)	
6	1076'	Level flt. min.
7	576'	100%
8	576'	Cutback
9	576'	Level flt. min.
10	326'	100%
11	326'	Cutback
12	326'	Level flt. min.

Runs 13-24 will repeat the above. Extra runs at the higher altitudes will be made as required.

The pilot of the test aircraft will report to NAFEC tower when he is two miles out inbound. The command post will monitor tower frequency and will direct the acoustic and tracking groups to commence taking data. The command post will state "Run complete" when the test aircraft is 3 n.m. to the northeast, at which time the test aircraft will enter a right-hand racetrack pattern to get into position for the next run.

After the test aircraft has completed a run, the weather plane will make a weather run on a heading of 040° commencing 500' above the test run altitude and descending to make a low pass to the center of the field, turn 90° left and flap at 126' msl out along the microphone array. The weather plane will then fly to the southeast and orbit until the test aircraft completes the next run.

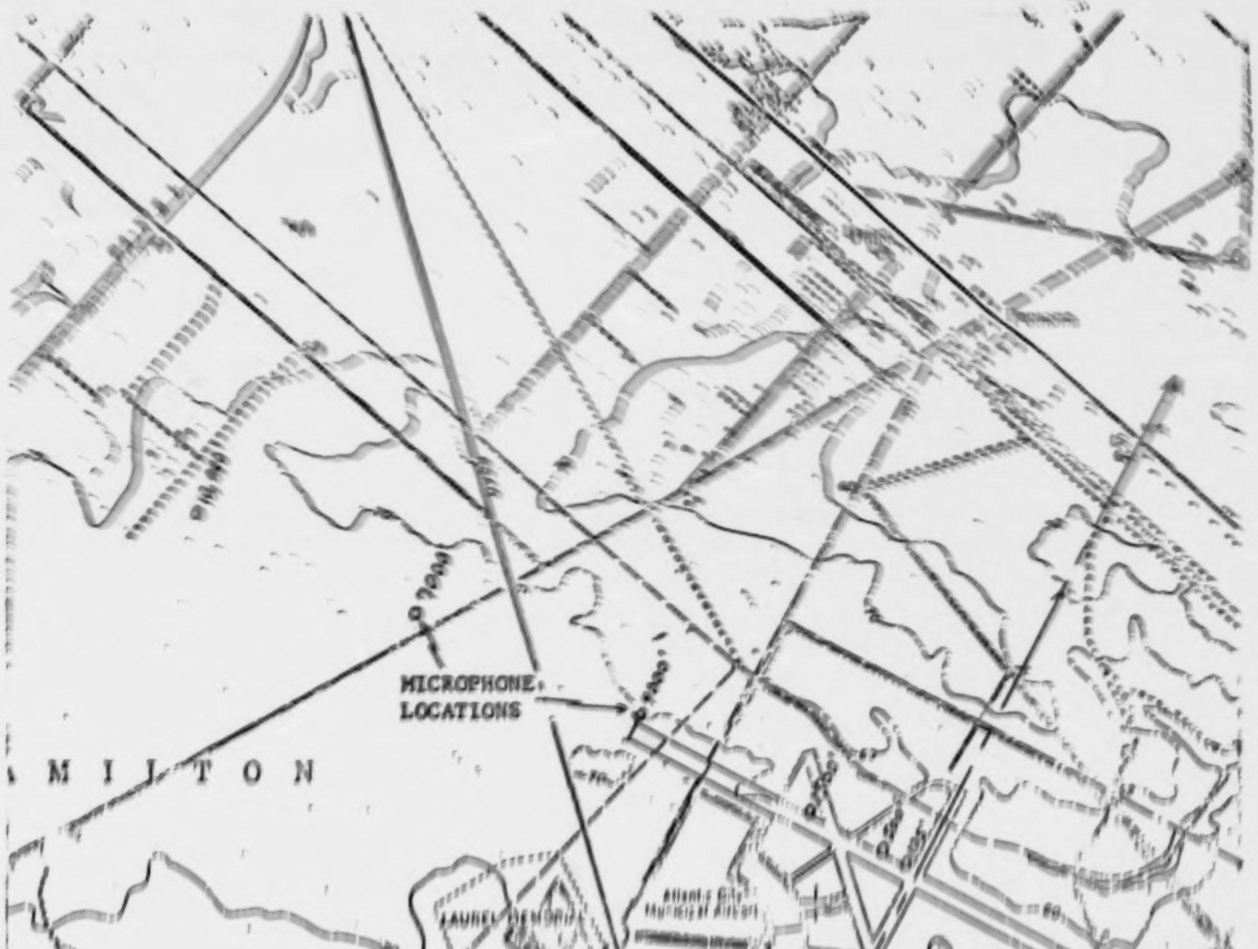

MICROPHONE LOCATIONS
MILTON
LAUREL MEMORIAL CEMETERY
Atlantic City Municipal Airport
VOR
US NAVAL RESERVATI
ATLANTIC CITY NAVAL AIR
DIRECTION OF FLIGHT (RIGHT HAND RACE TRACK PATTERN)

FIGURE 1. PHASE II TEST LAYOUT

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION
WASHINGTON, D.C. 20590

DATE: 24 AUG 1971

REPLY TO ATTN OF: EQ-20

SUBJECT: Operational/Procedural Noise Reduction Flight Program - Progress Report No. 3

TO: Deputy Administrator
Through: EQ-1

The execution of the subject program was initiated 5 April and concluded 30 April, as scheduled. Approximately a week of project flying was completed for each of the evaluation airplanes (B-727, KC-135, B-707-320B, and DC-9). A total of 90 hours of flight produced the program's objectives in obtaining acoustic data and procedural technique analysis for the 31 different departure, approach-to-land, and flyby operational flight profiles and paths flown. Approximately 400 individual flight events were executed in verifying the acoustic recordings and ensuring repeatability in piloting technique.

In general, the acoustic data was acquired and is being reduced in accordance with the procedures set forth in the appendices of FAR Part 36. The question of acquiring reliable acoustic data with winds greater than 10 knots was reviewed early in the first week of flight evaluation. It was decided that, while 10 knots or less was desired, such would not be a constraint to the project flying or data acquisition. It was further decided, and followed throughout the program evaluation, that if or when the winds became of that magnitude to be marginally acceptable to either the acoustic recordings or operational flying, the project flight period would be canceled. Several flight periods were in fact terminated because of this condition. The average wind reported from the control tower for the four weeks of flight evaluation was 11.7 knots--well within that to be experienced in day-to-day routine line operation.

Prior to the program's execution, a special invitation was extended to industry and interested persons for "on-site" visitation and pilot participation during the evaluation period. The response was gratifying, in that six airlines, the Air Line Pilots Association, consultant firms, and urban sound abatement groups sent representatives. The visiting pilots were given the opportunity to "ride" and in some instances to "fly" the procedures under evaluation. A program requirement, which is yet to be fulfilled, is to obtain written comments from both the project and visiting pilots as to cockpit workload, additional training, required instrumentation, apparent limitations--if any, and, in general, the impact on operational safety, were the evaluated procedures to be considered for implementation.

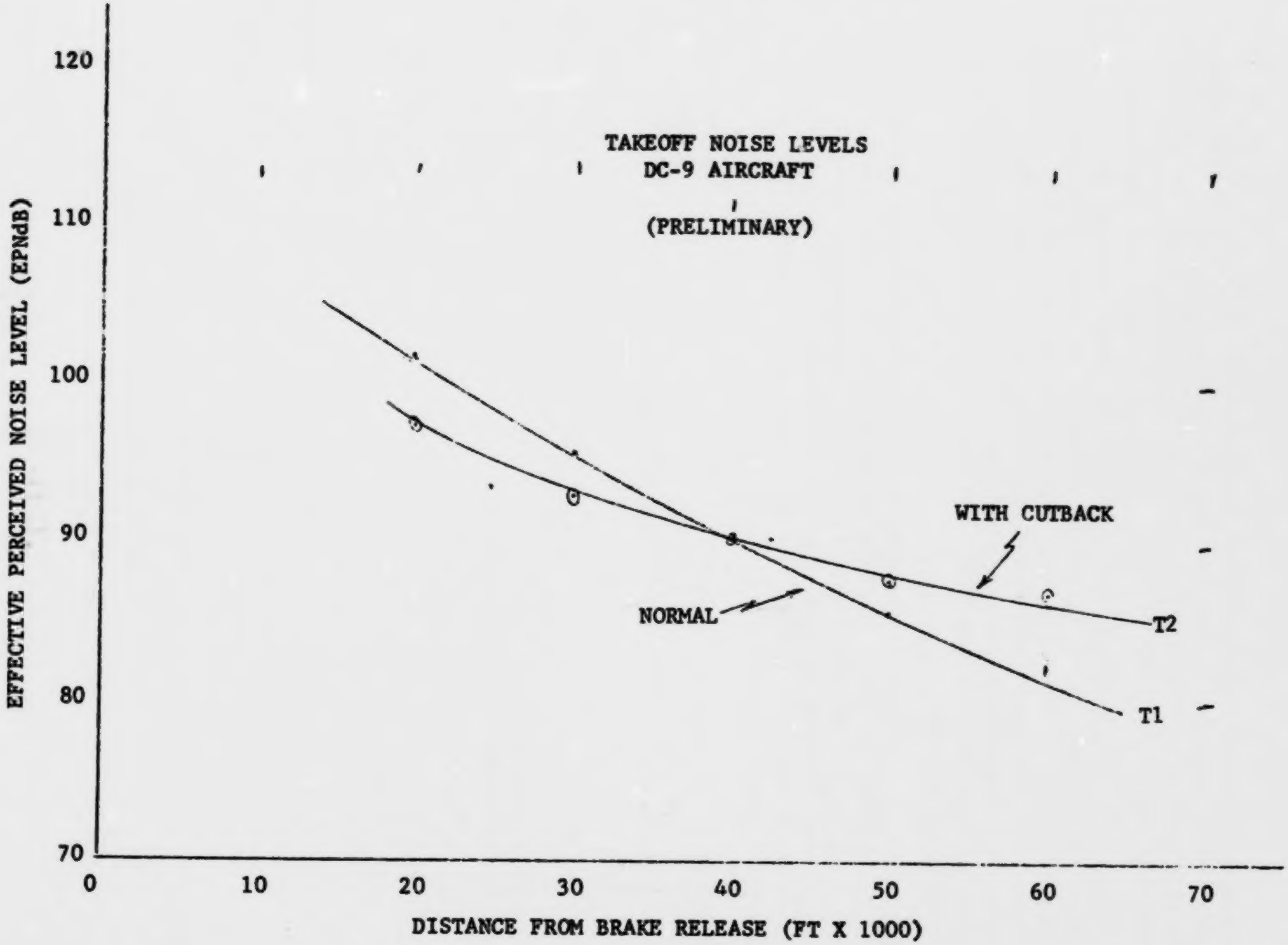
The acquired acoustic data are in the process of reduction and analysis. The final acoustic contractual report from which final analysis can be made is to be submitted to the agency in September. A review of the draft acoustic report indicates that an appreciable reduction in noise exposure can be attained. Enclosed are preliminary data plots from three of the airplanes evaluated (B-727, DC-9, and B-707-320B) for two approach-to-land profiles and two departures. It is interesting to note that, while the expected reduction in noise is gained between the approaches shown, 1500 foot to normal glide slope (2.5° at NAFEC) versus the 3000 foot two segment to normal slope, the gains in noise reduction for departures between using thrust cut at 1000 feet while holding climb-out speed and takeoff configuration constant versus no noise abatement procedure; i.e., clean up and accelerate to 250 knots at full thrust, are marginal to negative depending upon what distance from brake release a reduction is desired.

A final report, including recommendations, on the analysis of the total evaluation will be prepared and sent forth as soon as possible after receiving the final acoustic report, the pilot's procedural analysis, and the review and comments from Air Traffic Service as to the impact on the air traffic control system regarding the potential implementation of the profiles and paths evaluated.

The success of the program's execution can be directly attributed to the unqualified cooperation received collectively and individually from project people, plus complete facility and logistic project support.

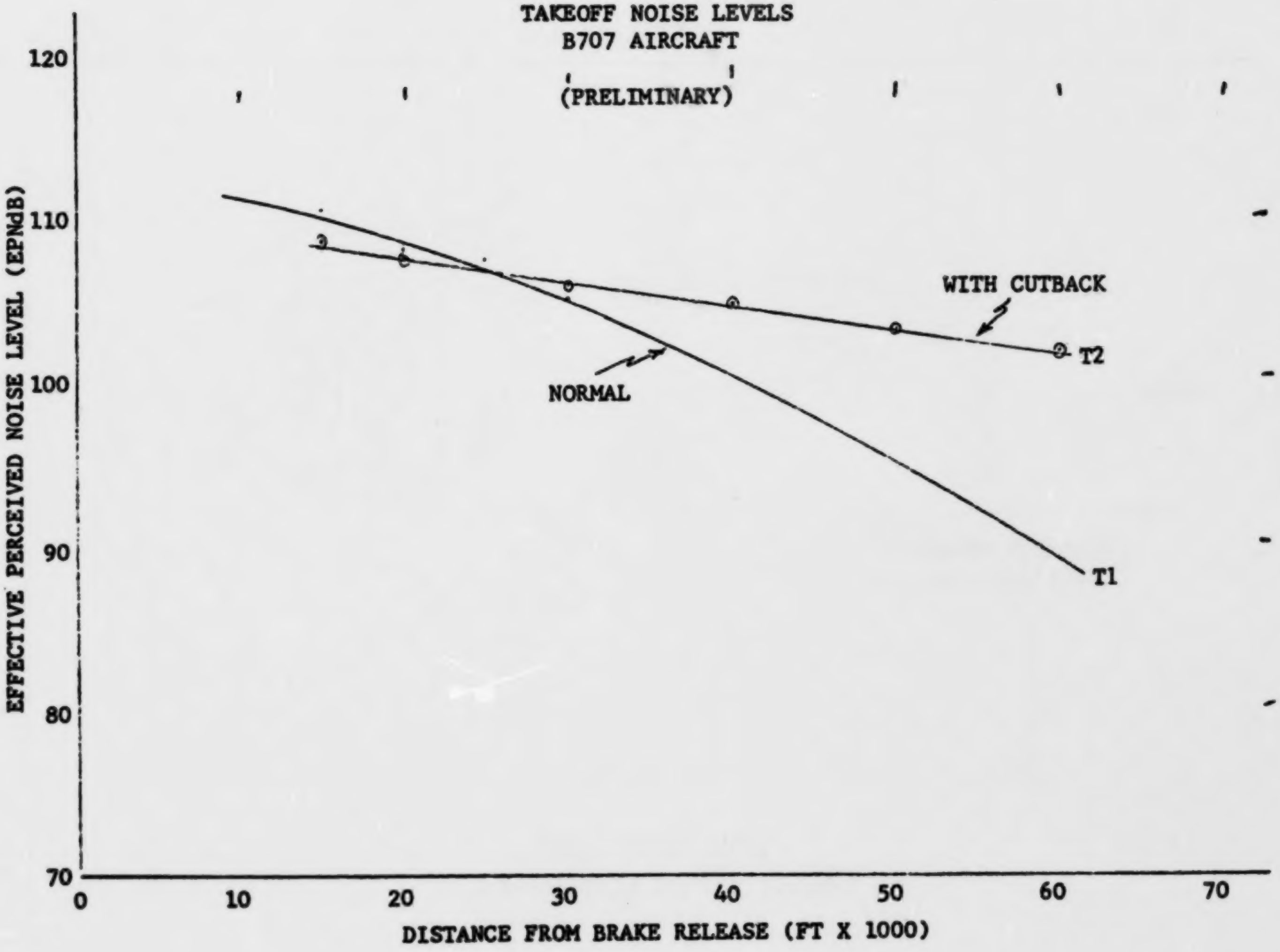
R. P. SKULLY, Director
Office of Environmental Quality, EQ-1

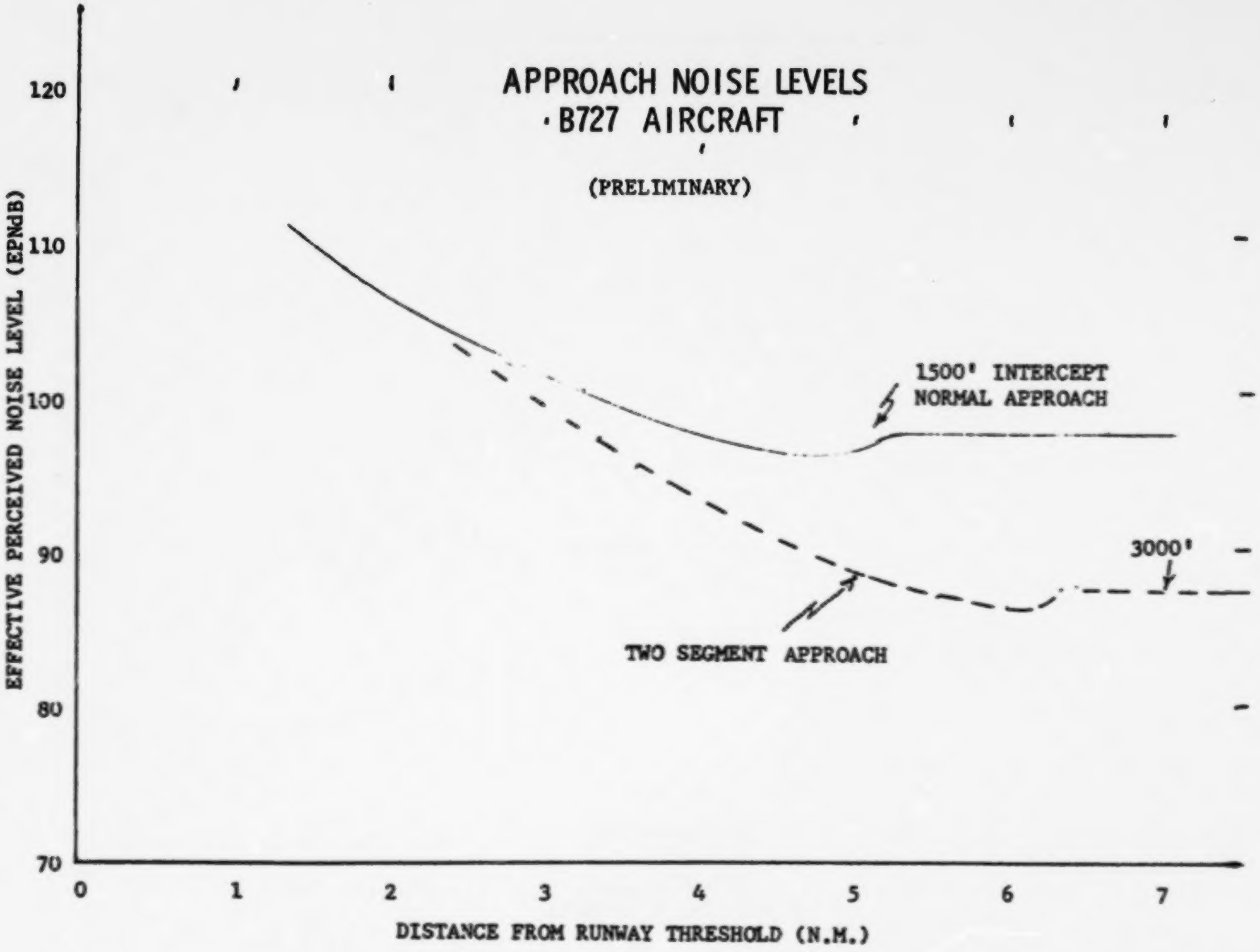
Enclosures



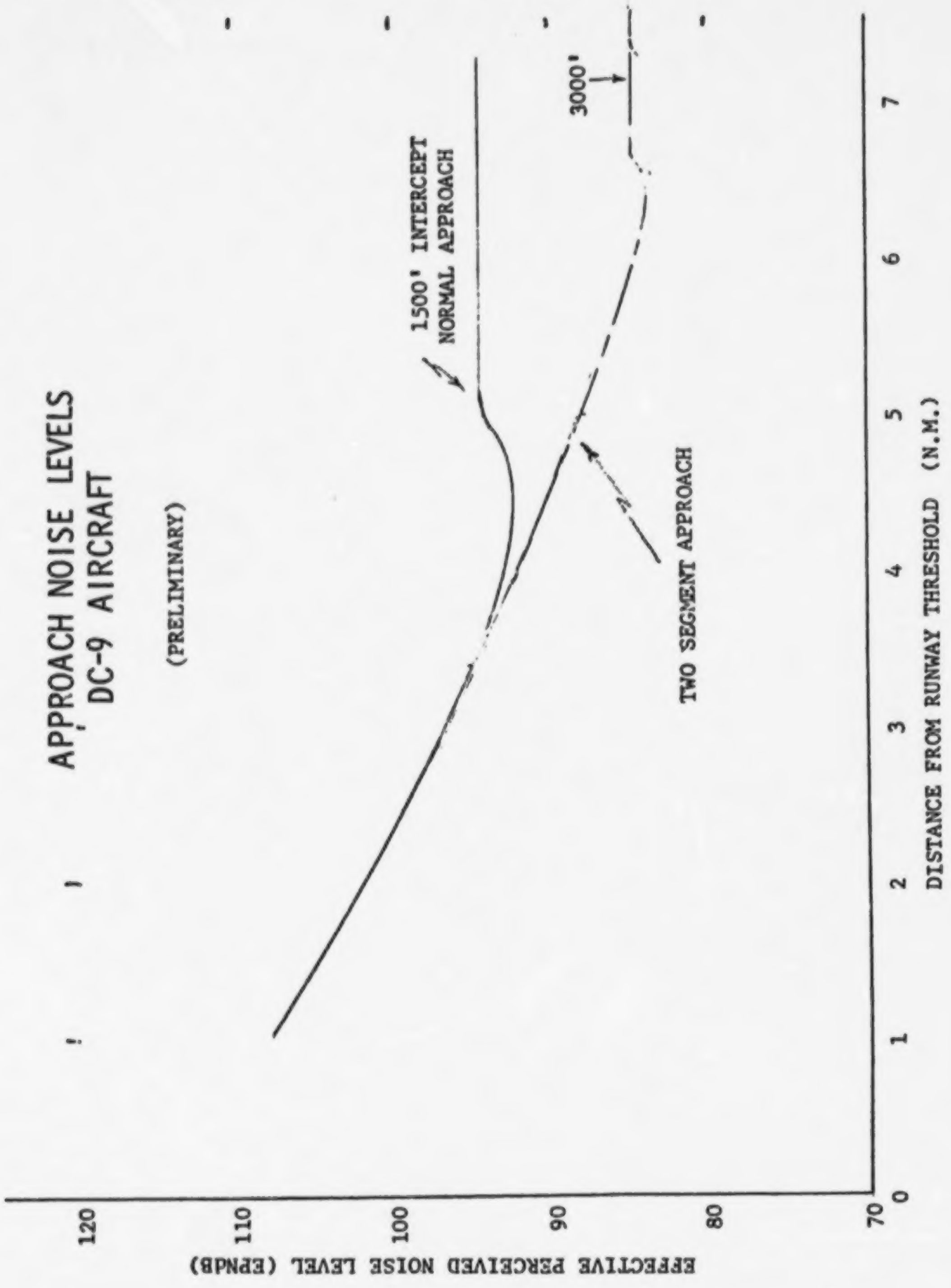
TAKEOFF NOISE LEVELS
DC-9 AIRCRAFT

(PRELIMINARY)



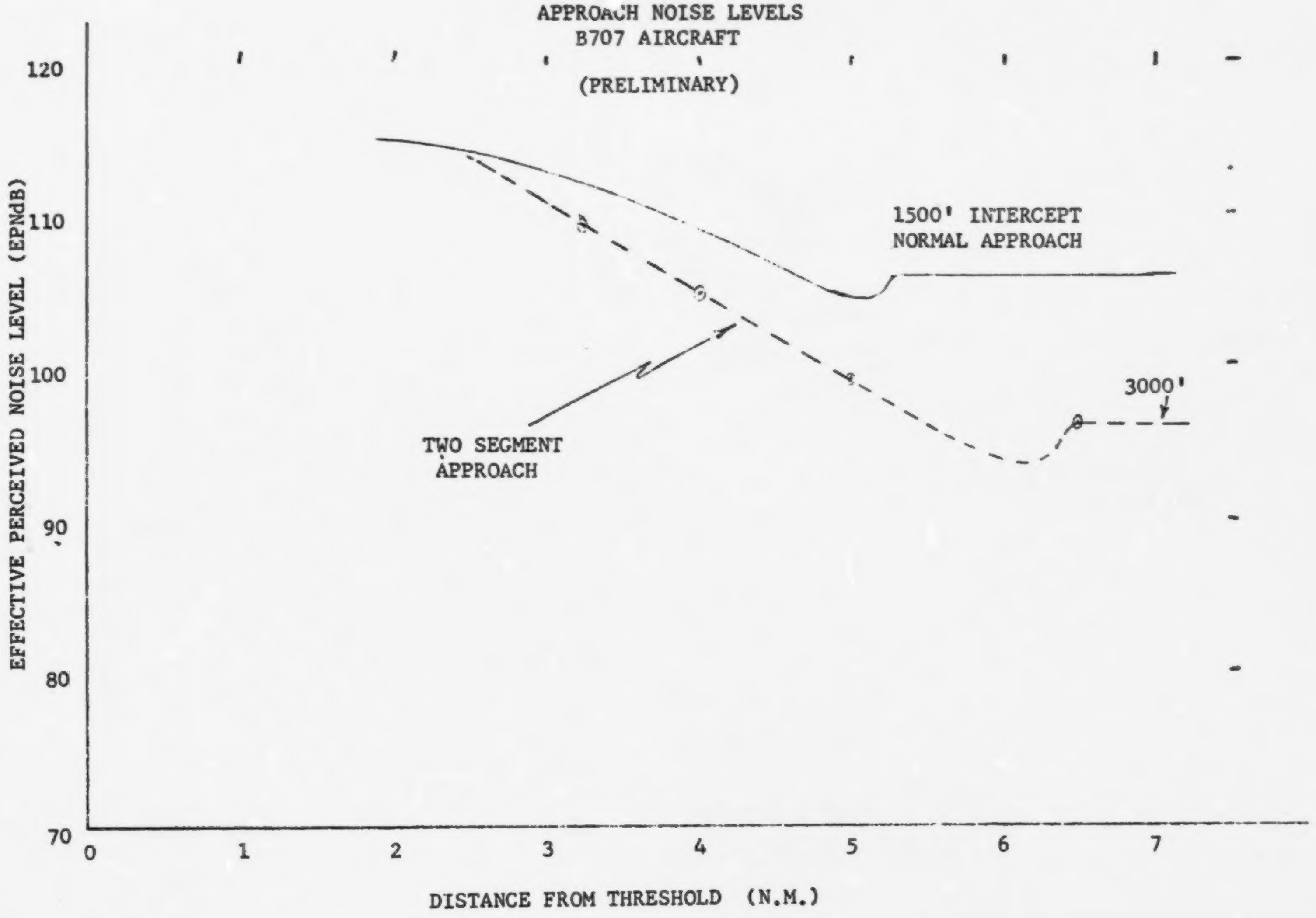


APPROACH NOISE LEVELS
B727 AIRCRAFT
(PRELIMINARY)



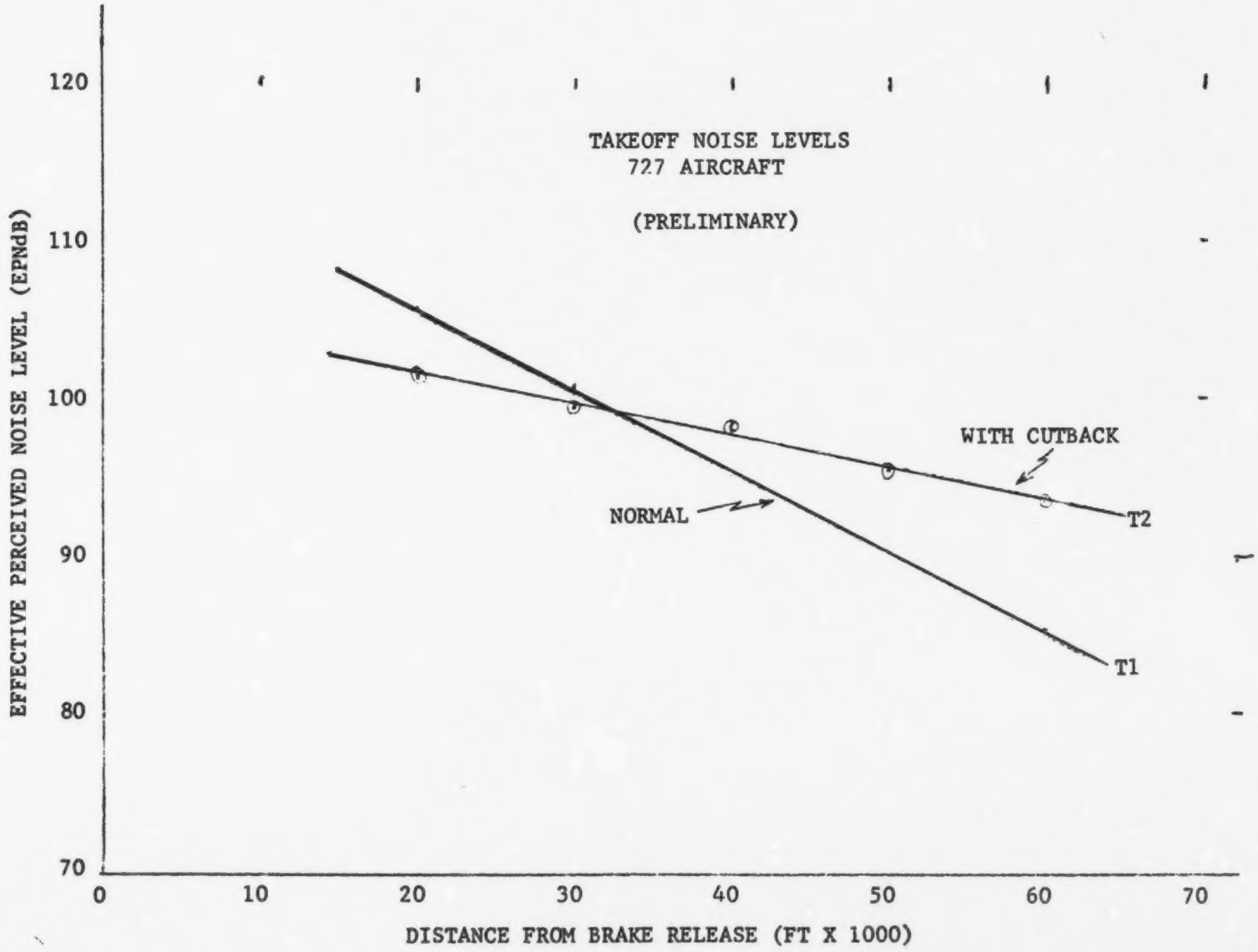
APPROACH NOISE LEVELS
DC-9 AIRCRAFT

(PRELIMINARY)



APPROACH NOISE LEVELS
B707 AIRCRAFT

(PRELIMINARY)


TAKEOFF NOISE LEVELS
727 AIRCRAFT
(PRELIMINARY)
EFFECTIVE PERCEIVED NOISE LEVEL (EPNdB)
120
110
100
90
80
70
0
10
20
30
40
50
60
70
DISTANCE FROM BRAKE RELEASE (FT X 1000)
WITH CUTBACK
NORMAL
T2
T1

DEPARTMENT OF AGRICULTURE

UNITED STATES DEPARTMENT OF AGRICULTURE
SCIENCE AND EDUCATION STAFF
WASHINGTON, D. C. 20250

August 31, 1971

SUBJECT: Federal Noise Program Information

TO: Alvin F. Meyer, Jr., Director
Office of Noise Abatement and Control
EPA

Enclosed is information on activities in USDA related to noise.

FRED H. TSCHIRLEY 3485
Pesticides Coordinator

Enclosure

FEDERAL NOISE PROGRAMS INFORMATION

I. Organizational

A. U. S. Department of Agriculture: Extension Service, Consumer and Marketing Service, Agricultural Research Service, Cooperative State Research Service, Forest Service.

B. Legislative Authorities: Clark-McNary Act of 1924; McSweeney-McNary Forest Research Act of 1928; Smith-Lever Act; Agric. Exp. Sta. Act of 1955 (Hatch Act of 1887, as amended).

II. Functional

A. Overall Program Objectives: (1) Conduct surveys as a part of safety program to determine noise levels emanating from agricultural sources, (2) conduct research on noise propagation and attenuation by vegetative screens.

B. Specific Programs:

1. The attenuation of noise by vegetation (Grant, Connecticut).
2. Noise and vibration of off-road equipment (Grant, Illinois).
3. Landscape ecology and stress physiology of plants (Grant, Ind.).
4. Safety and hazards - general (Grant, Nebraska).
5. Management characteristics of urban forest space (Grant, N.C.).
6. Extension education programs (visual aids and bulletins) on noise abatement of farm machinery, sawmills, and on-farm processing and personal protective equipment.
7. Effects of forest vegetation on noise attenuation (in-house).
8. Development of instrumentation for noise evaluation (in-house).

9. Effect of sonic booms on behavior, reproduction, and growth of farm-raised mink (cooperative research with Air Force, University of Washington, and University of Alaska).

10. Survey to determine noise levels in meat and poultry plants (integral part of safety program).

C. Procedures: The USDA programs related to noise are principally research projects, usually designed to answer specific problems. There has not been a coordinated thrust on an intensive scale. The research has been done inhouse, by means of grants to State agricultural experiment stations, and thru cooperation with other government agencies. Cooperative efforts are conducted as specific needs dictate.

III. Fiscal

A. Current program

1. Facilities have not been constructed only for the purpose of research on noise. Minimal equipment is now available.

2. The current operating budget is about $250,000.

3. Approximately 5 scientific man-years.

B. Past and future plans

1. Past programs have been nominal--below current level.

2. Future programs will probably remain near the current level although some increase can be expected in specific research areas.

IV. Regulation and Certification: Not applicable.

DEPARTMENT OF COMMERCE

THE ASSISTANT SECRETARY OF COMMERCE
Washington, D.C. 20230

September 10, 1971

Dr. Alvin F. Meyer, Jr.
Director, Office of Noise
Abatement and Control
Environmental Protection Agency
Washington, D.C. 20460

Dear Dr. Meyer:

This is in response to your letter of July 30, which requested information about the Department of Commerce programs which are directed toward noise abatement and control.

The enclosed outline summarizes the Department of Commerce programs dealing directly with either noise abatement or acoustics research and management. The programs are sponsored by the National Oceanic and Atmospheric Administration (NOAA) and the National Bureau of Standards (NBS). In addition to Departmental programs, NBS also performs noise-related research for a number of other Federal agencies. It should be noted that the Department of Commerce has no authority or responsibilities in the area of noise regulation or certification at the present time.

I hope that the information enclosed will be of assistance to you.

Sincerely,

Sidney R Galler

Sidney R. Galler
Deputy Assistant Secretary
for Environmental Affairs

Enclosure

U.S. DEPARTMENT OF COMMERCE
National Bureau of Standards
Washington, D.C. 20234

Date: September 2, 1971

Reply to Attn of: 421.14

Subject: Request from EPA for Information Regarding Department of Commerce Programs in the Area of Noise Abatement and Control

To:

Dr. R. E. Ferguson
Scientific Assistant to
the Associate Director for Programs

Attached is the information requested by the Environmental Protection Agency in their letter to Dr. Galler, Deputy Assistant Secretary for Environmental Affairs, Department of Commerce dated 30 July 1971.

We have attempted to outline in detail the in-house funded programs within the Department of Commerce which are directed toward noise abatement and control. We further have outlined our acoustics research, such as the development and standardization of calibration procedures, and have briefly described our work for other federal agencies.

I trust this information package will satisfy the original request and will provide EPA with the Commerce program data which they need to include in the discussion of the total Federal effort in their report to the President and Congress.

DANIEL R. FLYNN, Chief
Applied Acoustics and Illumination
Sensory Environment Branch
Building Research Division, IAT

cc: Dr. Ambler
Dr. Willenbrock
Mr. Irwin
Dr. Wright
Mr. Achenbach
Dr. Cook
Mr. Greenspan
Mr. Thompson
Mr. Kramer

Federal Noise Program Information

I. Organization - U.S. Department of Commerce

Within the Department of Commerce the National Bureau of Standards (NBS) and the National Oceanic and Atmospheric Administration (NOAA) conduct research and measurement programs in acoustics, some of which are directly related to noise abatement and control.

II. Function

A. Overall Program Objectives

1. NBS Role

Measurement plays a pervasive role in assessing the consequences of noise, its effect and control. Both the assessment of noise problems and the assessment of alternative strategies for noise abatement and control ultimately rest on accurate, reliable, and relevant measurement capability.

The NBS program being carried out within the Institute for Basic Standards (IBS) provides the needed basic measurement and calibration services, and extends the basic understanding of noise generation and transmission. The role of the Institute for Applied Technology (IAT) program is directed toward specific and actual noise problems that are of urgent importance to today's society.

2. NOAA Role

The general function of NOAA is to observe and collect comprehensive data about the state of the oceans and inland waters, of the upper and lower atmosphere, and of the space environment. They conduct basic research in atmospheric acoustics and the propagation of sound through the atmosphere. Their mission in acoustics is not specifically directed toward noise abatement and control and hence is not discussed herein.

B. Specific Programs - NBS

1. IBS - Mechanics Division

The following projects of the Sound Section are directly related to noise abatement and control.

Characterization of Reverberant Sound Fields

Objectives: Investigation of the physical properties of various types of reverberant sound fields and the physics involved in the transmission, attenuation, and absorption of airborne and structure-borne sound in materials and structures.

Investigations aimed at resolving the controversies involved in the use of human walkers, tapping machines or other impact devices as standard sources for measurement of impact sound insulation and surface noise radiation of flooring materials and floor-ceiling assemblies.

Development of new or improvement of existing methods for measurement of sound absorption and sound power in reverberation chambers.

Investigation of Loudness, Noisiness, and Annoyance

Objectives: Investigate present methods of measuring subjective loudness, noisiness, and aversiveness of sounds. Develop new methods for subjective measurement and correlate with physical characteristics of acoustic stimuli. Establish a more consistent psychophysical basis for loudness and noisiness calculating algorithms with application to noise abatement and control.

In addition to these activities, the Sound Section and the Vibration Section are engaged in basic research activities such as the development and standardization of calibration procedures for microphones, audiometers, sound level meters, earphones, vibration measuring systems, bone-vibrators, artificial ears, and hearing aids.

2. IAT- Building Research Division

The following projects are now being conducted by the Applied Acoustics and Illumination Section, Sensory Environment Branch.

Building Acoustics

Objectives: Develop improved test methods for measuring sound transmission through building component systems, such as floors, ceilings, walls and partitions; and through assembled components; such as windows, doors, ducts, and plumbing.

To develop improved test methods for measuring sound caused and distributed by internal equipment such as air conditioners, elevators, appliances, etc.

Conduct psycho-acoustics studies in order to minimize the effects of appliance and other household noises on the normal living pattern of the occupants. The research is directed toward the identification of basic parameters associated with "annoyance", the development of a simulation program based on these parameters, and ultimately the control of the unwanted noise sources by demonstrating the adverse behavioral consequences associated with them.

A second immediate goal is to develop methods of rating and testing the overall acoustical performance of assemblies of building elements and of entire buildings. Field measurements of noise in buildings in use will be made and the findings will be the base upon which laboratory evaluations are planned. By linking field experience of users with the laboratory test development, it is anticipated that the standards and codes derived will permit innovative design and construction techniques to be used in solution of the noise problem. The requirements, criteria, and evaluative tests developed would be the basis of standards for designers and building contractors to use for noise control in buildings.

3. Other Agency Programs

In addition to in-house supported projects, the National Bureau of Standards has a working budget of about $465,000 for other agency sponsored programs.

IBS

1. Department of Defense - a) Physical acoustics and the properties of matter, b) measure the responses of microphone systems designed for special applications.

2. HEW - prepare a book summarizing and interpreting experimental results on the properties of the normal human senses of sight, touch, and hearing from the standpoint of being instruments for perception of the physical world.

3. Veterans Administration - measurement of hearing aids.

4. Bureau of Mines - noise control for mine safety.

IAT

1. Department of Transportation - measurements and study of truck tire noise.

2. HUD - development of acoustical criteria for "Operation BREAKTHROUGH" housing systems and evaluation of these systems through review of plans and testing.

3. EPA - technical assistance for the preparation of its report on noise and its effect on the public health and welfare.

4. Justice - measurements and study of the noise generated by sirens and horns and their effectiveness as warning devices.

C. Procedures

Dr. Richard K. Cook serves as the Special Assistant (to the Deputy Director of the National Bureau of Standards) for Noise Abatement Programs. His duties include coordination of the basic and applied research efforts within the Bureau.

Within the Building Research Division, Mr. Samuel Kramer, as Federal Program Coordinator, serves as a liason for all other agency programs. The IAT program is intended to complement other agency programs so that NBS can provide the measurement and information base needed by other Federal agencies and by state and local governments to permit rational establishment and uniform énforcement of standards and regulations for noise control and abatement.

III. Fiscal

A. Current Programs

1. In addition to the laboratory facilities (including a large anechoic chamber and reverberation room) and associated equipment for acoustics research, the following real property is utilized for noise programs.

   a. facilities - $60,000
   b. equipment - $210,000

2. Current Operating Budget - $500,000 (approximately $200,000 of which is directly applied toward noise abatement and control).

3. Personnel - 24 professionals working on acoustics, including physicists, engineers and psychologists. [This is the total staff. Not all of these people are working on projects dealing with noise control].

4. Contracts, grants, loans, and subsidies

   a. Contract ($8000) with Bickerdike, Allen, Rich and Partners, London, England. The output of this contract will be a report which will be used as a source document for an NBS publication tentatively entitled "A Design Guide for Protection Against Environmental Noise". The report (contractor's) will be a digest of European information and data presented in a manner so as to be easily understood by architects and urban planners.

b. Contract ($33,000) with Owens-Corning Fiberglass Corporation, Granville, Ohio. The objective of the contract is to obtain meaningful data on the acoustical, thermal, and infiltration performance of doors and windows, and to relate this data to analytical or empirical expressions which can be utilized in building design.

B. Past and Future Programs

1. Past Programs

a. expenditures - a total of about $1,410,000 for the past five years (approximately $180,000 specifically for noise control).

b. facilities acquisitions - $60,000 for five years (These are facilities specifically for noise control programs and does not include the construction cost of the large anechoic chamber and reverberation rooms).

2. Future Programs

A $200,000 increase in in-house funding has been requested for FY-73. This increase would allow the National Bureau of Standards to expand their efforts in the field of noise control and abatement with expanded research programs in both the basic and applied research areas. Present programs would form the basis for expansion into new areas. Money has been requested in the FY-73 budget to cover the planning expenses for the design of an architectural acoustics and noise control facility. If planning funds are approved for FY 73, construction money would be requested in FY-74. The estimated total cost of this facility is $6 million.

IV. Regulation and Certification

The Department of Commerce has no authority or responsibilities in the area of noise regulations or certification at the present time.

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
Rockville, Md. 20852

SEP 10 1971

Mr. Alvin F. Meyer, Jr.
Director, Office of Noise Abatement and Control
Environmental Protection Agency
Washington, D. C. 20460

Dear Mr. Meyer:

This is in reply to your letter to Dr. William Aron of NOAA on the requested report dealing with Federal activities in noise effects, abatement and control.

Without the benefit of an emission inventory of major noise sources owned that will be requested by you in the future, our activities in this area have been minimal. Accordingly at this time, our report is submitted in the "negative."

Within NOAA, complaints of noise affecting NOAA employees, the General Radio Corporation Sound Survey Meter, Type 1555, is used to get basic readings. If the levels of noise are above the permissible levels as outlined in the Walsh-Healey Act, the Medical Director of the Department of Commerce is notified who then applies sophisticated audio testing leading to the necessary adjustments to reduce such noise or provide personnel protection equipment and/or reduce the exposure time of the personnel.

Sincerely,

E. F. McCann

E. F. McCann
Chief, Administrative Operations Div.

GENERAL SERVICES ADMINISTRATION

UNITED STATES OF AMERICA
GENERAL SERVICES ADMINISTRATION
WASHINGTON, D.C. 20405

September 10, 1971

Dr. Alvin F. Meyer
Director
Office of Noise Abatement
and Control
Environmental Protection Agency
Washington, D. C. 20460

Dear Dr. Meyer:

This letter is in response to your request of July 30, 1971, for information on GSA's noise programs.

Because GSA has, at present, no formal noise pollution abatement program underway, we cannot respond to your outline on a point-by-point basis.

However, GSA is involved in developing noise pollution abatement procedures for its construction and demolition operations as well as amending its procurement specifications to require quieter products. Enclosed are copies of experimental noise regulations and amended specifications. Shortly, three new lawn mower specifications will be issued which will include maximum sound level requirements.

I hope this information will be helpful. Please do not hesitate to call if I may be of further assistance.

Sincerely,

Robert H. McNulty

for AARON J. WOLOSHIN
Executive Director
Office of Environmental Affairs

Enclosures

Keep Freedom in Your Future With U.S. Savings Bonds

35. NOISE POLLUTION -GSA -PBS Experimental Provisions

35.1 The requirements of this paragraph 35 provide for the Contractor's active participation in (1) identifying the sources or causes of excessive noise generated during the course of construction work, and (2) identifying practical and reasonable steps to be taken for the purpose of reducing excessive noise and/or unnecessary noise to the extent feasible in construction work, and (3) establish by experience during the course of this contract a definition of "excessive noise level."

35.2 The Contractor shall furnish and keep at the site, at all times during the performance of work at the site, a General Radio Company Type 1565A sound level meter, a Type 1562A sould level calibrator and a Type 1556B impact noise analyzer, or such other equipment as will provide similar data and service of equal accuracy as the foregoing. In addition to using the equipment to perform the requirements set out in this paragraph 35, the Contractor shall make it available for use by the Contracting Officer for purposes contemplated by this paragraph 35.

35.3 The Contractor shall make readings, calculations and analyses, totalling the equivalent of an average of 5 per day during the entire construction period, commencing with the first day of work performed at the site. At his discretion, unless otherwise directed by the Contracting Officer, the Contractor may make fewer than five such noise level checks on those days when little work is being performed and more than 5 such noise level checks per day when deemed appropriate, so long as the total average is achieved. Radings shall be taken from points on the periphery of the site nearest the sources of greatest noise, as the Contractor may determine (except as may be otherwise directed by the Contracting Officer).

35.4 The Contractor shall maintain in duplicate a daily record setting out the date and, with respect to each check made, the time, the point of recording, the measurement, the source(s) or cause(s) and the characteristics of excessive noise, together with any analyses, comments or corrective action either initiated or to be discussed with the Contracting Officer. At the end of each work week, the original of the daily records for the week shall be forwarded to the Contracting Officer with any comment or recommendations the Contractor may wish to submit.

35.5 Excessive construction noise levels will be determined, using Table 3-6 in the General Radio Company's Handbook of Noise Measurement as a guide with respect to maximum permissible or acceptable levels.

35.6 On his own initiative, after consultation with the Contracting Officer, or at the direction of the Contracting Officer, the Contractor shall take such action and shall require his subcontractors to take such action as may be appropriate and effective to reduce or eliminate unnecessary noise and to reduce noise determined to be excessive, Provided, however, that if such action entails or will cause an increase in the cost of performing the work, the Contractor shall initiate such action or require his subcontractors to take such action only after consultation with the Contracting Officer and receipt of a written change order.

OO-G-669e
April 10, 1967

SUPERSEDING
Int. Fed. Spec. OO-G-00669d (GSA-FSS)
May 10, 1965 and
Fed. Spec. OO-G-669c
May 27, 1964

FEDERAL SPECIFICATION

GRINDER, PNEUMATIC, HORIZONTAL AND VERTICAL

This specification was approved by the Commissioner, Federal Supply Service, General Services Administration, for the use of all Federal agencies.

1. SCOPE AND CLASSIFICATION

1.1 Scope. This specification covers portable pneumatic tools for use in grinding, snagging, and wire brushing that are most generally used by the Federal Government.

1.2 Classification.

1.2.1 *Types and sizes.* Portable pneumatic grinders shall be of the following types and sizes as specified (see 6.2):

Type I.—Horizontal grinders.
  Size:
    2 inch.
    2-1/2 inch.
    3 inch.
    4 inch.
    6 inch.
    8 inch.
Type II.—Vertical grinders.
  Size:
    4 inch.
    6 inch—heavy duty.
    6 inch—standard duty.

2. APPLICABLE DOCUMENTS

2.1 Specifications and standards. The following specifications and standards, of the issues in effect on date of invitation for bids or request for proposal, form a part of this specification:

Federal Standard:

Fed. Std. No. 123—Marking for Domestic Shipment (Civilian Agencies).

(Activities outside the Federal Government may obtain copies of Federal Specifications, Standards, and Handbooks as outlined under General Information in the Index of Federal Specifications and Standards and at the prices indicated in the Index. The Index, which includes cumulative monthly supplements as issued, is for sale on a subscription basis by the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. 20402.

(Single copies of this specification and other product specifications required by activities outside the Federal Government for bidding purposes are available without charge at the General Services Administration Regional Offices in Boston, New York, Washington, D. C., Atlanta, Chicago, Kansas City, Mo., Dallas, Denver, San Francisco, Los Angeles, and Seattle, Wash.

(Federal Government activities may obtain copies of Federal Specifications, Standards, and Handbooks and the Index of Federal Specifications and Standards from established distribution points in their agencies.)

Military Specification:

MIL-P-12829—Packaging of Pneumatic Hand Tools with Attachments and Accessories.

Military Standards:

MIL-STD-105—Sampling Procedures and Tables for Inspection by Attributes.

MIL-STD-129—Marking for Shipment and Storage.

(Copies of Military Specifications and Standards required by contractors in connection with specific procurement functions should be obtained from the procuring activity or as directed by the contracting officer.)

FSC 5130

2.2 Other publications. The following documents form a part of this specification to the extent specified herein. Unless otherwise indicated, the issue in effect on date of invitation for bids or request for proposal shall apply.

National Bureau of Standards (NBS) Handbook:

H28—Screw-Thread Standards for Federal Services.

(Application for copies should be addressed to the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C., 20402.)

American Standards Association (ASA) Publication:

ASA B7.1 - 1964—American Standard Safety Code for the Use, Care and Protection of Abrasive Wheels.

ASA B5.38 - 1958—Driving and Spindle Ends for Portable Air and Electric Tools.

(Application for copies should be addressed to the American Standards Association, 10 East 40th St., New York 16, N. Y.)

(Technical society and technical association specifications and standards are generally available for reference from libraries. They are also distributed among technical groups and using Federal agencies.)

3. REQUIREMENTS

3.1 Illustrations. The illustrations shown herein are descriptive, not restrictive, and are not intended to preclude the purchase of grinders otherwise conforming to this specification.

3.2 Qualification. Portable pneumatic grinders furnished under this specification shall be products which have been tested, and passed the qualification tests specified herein, and have been listed on or approved for listing on the applicable qualified products list.

3.3 Material. Material used in the construction of the grinders shall be of a good commercial quality suitable for the intended purpose. All materials used shall be free from defects and imperfections that may adversely affect the serviceability of the finished product.

3.4 Screw threads. Threaded parts, including screws, bolts, and nuts, shall conform to the applicable requirements of NBS H28.

3.5 Identification of product. Grinders shall be furnished with a nameplate. The nameplate shall be marked in a plain and permanent manner with the maximum speed at no load and the maximum diameter of the abrasive wheel recommended for use on the grinder. The nameplate shall have the manufacturer's model, type, or size designation, together with the manufacturer's name or a trademark of such known character that the source of manufacture may be easily determined.

3.6 Lubrication.

3.6.1 *Primary lubrication.* Grinders shall be provided with an oil reservoir. The oil reservoir shall be of sufficient capacity so that one filling will supply lubrication to the rotor, cylinder, and other moving parts in the path of the air stream for at least 8 hours of continuous operation. The oil shall be fed from the reservoir by an automatic device that functions through an action dependent upon the operation of the grinder. The oil flow shall be regulated so that lubrication will be sufficient without excessive quantities of lubricant being discharged from the grinder with the exhaust air.

3.6.2 *Secondary lubrication.* Conventional type lubricating fittings or openings or other suitable means shall be provided for introduction of sufficient lubricant for bearings, gears, and other moving parts not lubricated from the oil reservoir. The fittings and openings shall be such that lubrication is required only once in not less than 48 hours of actual operation. Where acceptable prelubricated sealed bearings are used, no external means of lubrication shall be required for these parts.

3.7 Air inlet connection. The air inlet connection shall consist of a well-secured ferrous

This document has been approved for public release and sale; its distribution is unlimited.

OO-G-669e
INTERIM AMENDMENT-3 (NAVY-Ships)
July 22, 1971
SUPERSEDING[1]
INTERIM AMENDMENT-2 (NAVY-Ships)
December 15, 1969

INTERIM AMENDMENT

TO

FEDERAL SPECIFICATION

GRINDER, PNEUMATIC, HORIZONTAL AND VERTICAL

This interim amendment was developed by the Department of the Navy, Naval Ship Engineering Center, Center Building, Hyattsville, Maryland 20782, based upon currently available technical information. It is recommended that Federal agencies use it in procurement and forward recommendations for changes to the preparing activity at the address shown above.

The General Services Administration has authorized the use of this interim amendment as a valid exception to Federal Specification OO-G-669e and Amendment-1 dated May 24, 1968.

Page 1

1.2.1: Under type I, size, delete "2 inch" and "2-1/2 inches" and substitute the following:

"2 inch
  Style 1 - Extended spindle.
  Style 2 - Short spindle.
 2-1/2 inch
  Style 1 - Extended spindle.
  Style 2 - Short spindle."

2.1: Add:

"Federal Specification:
PPP-P-40 - Packaging and Packing of Hand Tools."

2.1: Delete:
"Federal Standard:
Federal Standard No. 123 - Marking for Domestic Shipment (Civilian Agencies).

Military Specification:
MIL-P-12829 - Packaging of Pneumatic Hand Tools with Attachments and Accessories.

Military Standard:
MIL-STD-129 - Marking for Shipment and Storage."

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[1] CHANGES FROM PREVIOUS ISSUE. THE OUTSIDE MARGINS OF THIS DOCUMENT HAVE BEEN MARKED "#" TO INDICATE WHERE CHANGES (DELETIONS, ADDITIONS, ETC.) FROM THE PREVIOUS ISSUE HAVE BEEN MADE. THIS HAS BEEN DONE AS A CONVENIENCE ONLY AND THE GOVERNMENT ASSUMES NO LIABILITY WHATSOEVER FOR ANY INACCURACIES IN THESE NOTATIONS. BIDDERS AND CONTRACTORS ARE CAUTIONED TO EVALUATE THE REQUIREMENTS OF THIS DOCUMENT BASED ON THE ENTIRE CONTENT AS WRITTEN IRRESPECTIVE OF THE MARGINAL NOTATIONS AND RELATIONSHIP TO THE LAST PREVIOUS ISSUE.

FSC 5130

Page 2

2.2: Delete in its entirety all reference to "American Standards Association (ASA) Publications" and substitute the following:

"AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)
ANSI B5.38-1958 - Driving and Spindle Ends For Portable Air and Electric Tools.
ANSI B7.1-1970 - American Standard Safety Code for the Use, Care and Protection of Abrasive Wheels.
ANSI S5.1-1971 - Test Code for the Measurement of Sound from Pneumatic Equipment.

(Copies may be obtained from the American National Standards Institute, Inc., 1430 Broadway, New York, New York 10018.)"

3.2: Delete and substitute:

"3.2 Qualification. Portable pneumatic grinders furnished under this specification shall be products which are qualified for listing on the applicable qualified products list at the time set for opening of bids (see 4.2 and 6.3)."

3.3: Delete and substitute:

"3.3: Materials. The materials used in the construction of items and components shall be sound, of uniform quality and condition, and shall conform in composition, heat treatment, and suitability to the standard practices of manufacturers producing tools of the types required in this specification. Equipment and parts shall be new and high grade commercial quality."

3.6., 3.6.1, and 3.6.2: Delete and substitute:

"3.6 Lubrication.

"3.6.1 Primary lubrication. Grinders shall be provided with an oil reservoir, either built-in or of the airline lubricator type. Capacity of the reservoir shall assure metered lubrication of all moving parts in the air stream, from one filling, for a minimum operating period of 8 hours.

"3.6.2 Secondary lubrication. Grinders requiring periodic lubrication of parts other than those in the air stream shall be provided with external means of applying the required lubricant without disassembling the tool."

Page 3

After 3.9, add the following as 3.9.1:

✓# "3.9.1 Sound pressure level. The sound pressure level shall not exceed 95 dbA for all sizes in any prescribed microphone location."

Pages 4 and 5

3.17.1: Delete and substitute:

"3.17.1 Styles and handles. Size 2 inch and 2-1/2 inch grinders shall be style 1 or 2. Style 1 grinders shall have an extended spindle enclosed in a metal housing. The outside dimension of the extension housing shall not exceed 2 inches; the length shall be not less than 2 inches and the shape shall be such as to afford a grip for two-hand operation of the tool. Style 2 grinders shall have a short spindle with the abrasive wheel adapter close-coupled to the body of the grinder and without an intentional extension. Grinder sizes larger than 2-1/2 inches shall be provided with either a straight or spade handle, as specified (see 6.2) and the housing at the spindle end shall be of such shape as to function as a handgrip for two-hand operation of the tool."

Page 6

4.1: Delete and substitute:

"4.1 Responsibility for inspection. Unless otherwise specified in the contract or purchase order, the supplier is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified in the contract or order, the supplier may use his own or any other facilities suitable for the performance of the inspection requirements specified herein, unless disapproved by the Government. The Government reserves the right to perform any of the inspections set forth in the specification where such inspections are deemed necessary to assure that supplies and services conform to prescribed requirements."

4.2, line 3: Delete "Bureau of Ships" and substitute "Naval Ship Engineering Center".

4.2, line 9: Delete "Provisions Governing Qualification" and substitute "Provisions Governing Qualification SD-6".

Add the following paragraphs: #

✓ "4.6.3 Sound pressure level test. Sound pressure levels shall be taken at an unobstructed distance of one meter from the tool, both in the "free running" and "on load" conditions. The sound pressure level test shall be conducted in accordance with the applicable provisions of ANSI S5.1, except as modified herein. The acceptable limits shall be as specified in 3.9.1.

"4.6.3.1 Acoustical calibration. The entire instrumentation system shall be calibrated before each test series, allowing a minimum instrument warmup period of 5 minutes if transistorized and 1/2 hour if vacuum tube. Recalibration shall be performed if any instrument adjustment is necessary during progress of the test. #

"4.6.3.2 Background sound level. The ambient noise level shall be at least 10 dbA less than the measurement taken with the tool running, in all tool and microphone orientations. In addition, the sound produced by the energy absorbing device, used in the "on load" test, must be at least 10 dbA below the machine's own sound output."

Paragraphs 5.1, 5.2, 5.2.1, 5.2.2: Delete and substitute: #

"5.1 Preservation, packaging, packing, and marking. Grinders shall be preserved, packaged, packed, and marked in accordance with PPP-P-40 as specified for the applicable level."

Page 8

Add the following new paragraph: #

"6.1.3 Maximum sound pressure levels have been set to insure against occupational noise-induced hearing losses. The tools covered by this specification are considered to be used in bursts of 20 minutes duration with 5 minutes off between bursts over an exposure period of 8 hours."

6.2, (b): Delete and substitute:

"(b) Type, size, style, if applicable, and handle configuration required (see 1.2.1, 3.17.1 and tables I and III as applicable). #

6.2, (g): Delete and substitute:

"(g) Marking requirements (see 5.1)." #

6.3: Delete and substitute:

"6.3 With respect to products requiring qualification, awards will be made only for products which are at the time set for opening of bids, qualified for inclusion in applicable Qualified Products List QPL OO-G-669, whether or not such products have actually been so listed by that date. The attention of the suppliers is called to this requirement, and manufacturers are urged to arrange to have the products that they propose to offer to the Federal Government tested for qualification in order that they may be eligible to be awarded contracts or orders for the products covered by this specification. The activity responsible for the Qualified Products List is the Naval Ship Engineering Center, Prince George's Center, Page 8 (cont'd.)

Center Building, Hyattsville, Maryland 20782, and information pertaining to qualification of products may be obtained from that activity. Application for Qualification tests shall be made in accordance with "Provisions Governing Qualification SD-6" (see 6.4)."

Add the following as 6.4:

"6.4 Copies of "Provisions Governing Qualification SD-6" may be obtained upon application to Commanding Officer, Naval Publications and Forms Center, 5801 Tabor Avenue, Philadelphia, Pennsylvania 19120."

Preparing activity:
Navy - SH
(Project 5130-N208)

OO-G-669e
AMENDMENT-1
May 24, 1968

FEDERAL SPECIFICATION

GRINDER, PNEUMATIC
HORIZONTAL AND VERTICAL

This amendment which forms a part of Federal Specification OO-G-669e, dated April 10, 1967, was approved by the Commissioner, Federal Supply Service, General Services Administration, for the use of all Federal agencies.

PAGE 2

Paragraph 2.2: Delete in its entirety all reference to "American Standards Association (ASA) Publications" to end of paragraph ending with "agencies.)" and substitute:

United States of America Standard Institute (USASI) Standard:
B7.1-1964 - American Standard Safety Code for the Use, Care, and Protection of Abrasive Wheels.

(Applications for copies should be addressed to the United States of America Standard Institute, 10 E. 40th St., New York, N.Y. 10016.)

(Technical society and technical association specifications and standards are generally available for reference from libraries. They are also distributed among technical groups and using Federal agencies.

PAGE 3

Paragraphs 3.12 and 3.13: Delete "ASA B5.38 and ASA B7.1" and substitute "USASI B7.1".

PAGE 5

Paragraphs 3.17.3 and 3.18.3: Delete in their entirety.

PAGE 7

Table V, item 1, line 2: Delete "ASA" and substitute "USASI".

Table V, item 14, line 1: Delete "not type specified".

PAGE 8

Paragraph 6.2 (e): Delete in its entirety.

☆ U. S. GOVERNMENT PRINTING OFFICE: 1968 O - 342-501 (3021)

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fitting, threaded with internal American Standard taper pipe threads (NPT) or internal Dryseal American Standard taper pipe threads (NPTF). The air inlet shall be fitted with an air strainer or screen which shall be effective in retaining solid particles in the compressed air supply. The strainer or screen shall be of such design that it can be easily removed for cleaning.

3.8 **Bearings.** All rotating parts of the grinder shall be provided with commercially available rolling contact bearings. The rotor shaft shall be provided with ball bearings. Needle and roller bearings, which are primarily designed for radial loads, shall not be used in a thrust position. If open type bearings are used, they shall be suitably housed and adequately sealed to prevent leakage of lubricant and entrance of dirt and dust.

3.9 **General construction.** Grinders shall be of rugged construction so as to withstand, without failure, treatment likely to be encountered under general service conditions. Grinders shall be self-contained, readily accessible for adjustment or replacement of parts. Parts which require lubrication shall be properly enclosed so as to prevent entrance of foreign particles and leakage of lubricant. Working parts exposed to wear shall be of sufficient hardness to withstand the service required. Parts shall be properly finished by machining or grinding to dimensions within limits established by good commercial practice. Similar parts shall be interchangeable and of good fit when assembled with relative parts of the same size, type, and make. Grinders shall be reliable and effective when operated on compressed air lines at gage pressures between 80 and 100 pounds per square inch (p.s.i.).

3.10 **Housing.** Housings shall be strong enough to prevent indentation under service conditions. When threaded fasteners are utilized to assemble adjacent housing components, through bolting shall be used in preference to tapped holes. Capscrews, if used, shall engage threads in ferrous housings or ferrous inserts in nonferrous housings by not less than a length equal to the pitch diameter of the fastener thread. Where ferrous inserts are not used in nonferrous housings, capscrews shall engage threads by not less than a length equal to 1-1/2 times the pitch diameter of the fastener thread. All threaded fasteners shall be secured with suitable locking devices.

3.11 **Motor.** The motor shall be of the rotary vane type. The rotor shall consist of one or more elements accurately balanced with the rotor shaft, and shall be propelled by compressed air through the attendant action of vanes or blades made of suitable composition.

3.12 **Spindle arbors.** Spindle arbors shall be of the size specified (see tables I and III) and shall conform to the applicable requirements of ASA B5.38.

3.13 **Abrasive wheel guards and flanges.** Each grinder shall be furnished with wheel guards and flanges conforming to ASA B7.1. They shall be suitable for use with the maximum diameter and thickness grinding wheel to be used with the grinder specified.

3.14 **Throttle.** Grinders shall be provided with a nonleakable, manual throttle for admitting and shutting off the supply of compressed air. The throttle shall be conveniently located for easy manipulation by the operator while both hands hold the grinder in the operating position.

3.15 **Speed regulation.** Except as specified in 3.17.2, grinders shall be provided with a governor to automatically regulate the speed of the rotor. The governor shall prevent excessive speed when the spindle is free of load, and maintain efficient operating speeds under all normal loads applied to the abrasive wheel. In the event of failure of the governor or any of its parts, the spindle shall not maintain dangerously high speeds. At all normal loads, the spindle speed shall be controlled so that there will be no abrupt

TABLE I. *Type I, horizontal grinders, dimensional and weight requirements*

Size of grinder	Maximum wheel capacity (inches)						Air inlet nominal pipe size	Standard spindle arbor dia.	Maximum weight[1]
	Peripheral grinding straight type				Radial wire brush	Buffing wheel			
	Hard organic bond		Vitrified bond						
Inches	*Diameter*	*Thickness*	*Diameter*	*Thickness*	*Diameter*	*Diameter*	*Inch*	*Inch*	*Pounds*
2	2	1/2	1-1/2	1/2	—	—	1/4 or 3/8	3/8	5
2-1/2	2-1/2	1/2	1-3/4	1/2	—	—	1/4 or 3/8	3/8	5
3	3	1/2	2	1/2	—	—	3/8 or 1/2	3/8	6
4	4	1	3	1	4	—	3/8 or 1/2	5/8	10
6	6	1	4	1	6	6	3/8 or 1/2	5/8	12
8	8	1	5	1	8	8	3/8 or 1/2	5/8	16

[1] Without abrasive wheel, wheel guard, or wheel flanges.

TABLE II. *Performance requirements for types I and II grinders*

Size of grinder		Specified torque	At specified torque		At no load	
Type I, horizontal	Type II, vertical		Speed (min.)	Air consumption (max.)	Speed (max.)	Air consumption (max.)
Inches	*Inches*	*Ft. lbs.*	*R.p.m.*	*Cu. ft./min./hp.*	*R.p.m.*	*Cu. ft./min.*
2		0.15	11,000	80	18,500	32
2-1/2		.20	9,500	65	15,000	27
3		.65	6,000	60	12,000	35
	4	1.5	6,000	50	9,000	45
4		1.5	6,000	40	9,100	52
6		2	5,000	30	6,200	37
	6-(heavy duty)	3	3,500	35	4,700	30
	6-(standard duty)	2	4,500	35	6,000	30
8		3	3,500	30	4,600	30

or erratic variations affecting grinding operations.

3.16 **Method of drive.** The rotor and abrasive wheel spindle shall be directly coupled, with no intermediate gearing, so that the speed of both is the same.

3.17 **Type I, horizontal grinders.** Type I grinders shall be similar to figure 1 and shall conform to the applicable requirements of tables I and II.

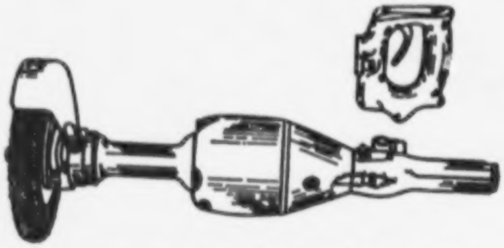

FIGURE 1. Type I, horizontal grinder.

3.17.1 *Handles.* Grinders, except sizes 2 and 2-1/2 inch, shall be provided with either a straight or spade handle. The housing at the spindle end of grinders, 9 inches or more in length, shall be of such shape as to permit a secure handgrip. The bodies of sizes 2- and 2-1/2-inch grinders shall be of such shape as to permit a secure comfortable handgrip.

3.17.2 *Speed regulation.* Grinders shall be equipped with a governor in accordance with 3.15, except that sizes 2- and 2-1/2-inch grinders may be designed to inherently regulate the supply of air to limit the spindle speed at no load. The spindle speed at no load shall be in accordance with the maximum allowable no load speed specified in table II when supplied with air at a gage pressure of 90 pounds p.s.i. (see 4.6.1).

3.17.3 *Throttles.* Horizontal grinders shall be furnished with lever-style throttles, unless otherwise specified (see 6.2).

3.18 Type II, vertical grinders. Type II grinders shall be similar to figure 2 and shall conform to the applicable requirements of tables II and III.

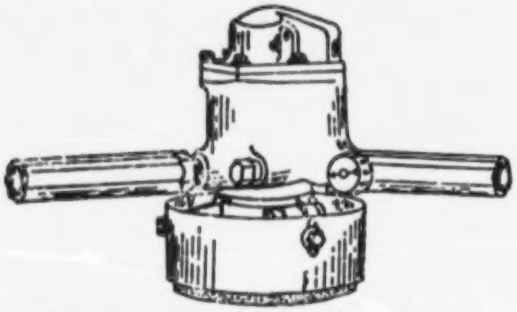

FIGURE 2. Type II, vertical grinder.

3.18.1 *Spindle arbor.* Spindles shall be adaptable for use with depressed center abrasive wheels, cup-type wire brushes, and sanding pads.

3.18.2 *Handles.* Vertical grinders shall have two straight handles whose longitudinal axis shall be parallel to the grinding face of the abrasive wheel. Handles shall be located at such an angle from each other as to facilitate handling and operation of the grinder when in use.

3.18.3 *Throttles.* Unless otherwise specified (see 6.2), vertical grinders shall be furnished with thumb-flip (butterfly) throttles.

3.19 Accessories or extra equipment. When accessories or extra equipment are required, they shall be as specified (see 6.2).

3.19.1 *Belt grinding attachment.* When a belt grinding attachment is required, the length and width of the belt accommodated shall be as specified (see 6.2). The belt grinding attachment shall consist of an offset bracket, driver wheel, contact wheel, offset shaft, and other parts needed for operation.

3.20 Instruction book. One copy of an instruction book consisting of the manufacturer's standard commercial instructions and parts list, bound together, shall be furnished with each grinder.

TABLE III. *Dimensional and weight requirements for type II vertical grinders*

Size of grinder	Maximum capacity (inches)					Air inlet nominal pipe size	Standard spindle arbor thread (UNC series)	Maximum[1] weight
	Cup-type wheel		Cup-type wire brush	Sanding disc	Depressed center abrasive wheel			
	Resinoid and rubber bond	Vitrified bond						
Inches	*Diameter*	*Diameter*	*Diameter*	*Diameter*	*Diameter*	*Inch*	*In. thd.*	*Pounds*
4	4	—	5	5	—	3/8 or 1/2	5/8	8
6 (standard duty)	6	4	6	7	7	do.	5/8	9
6 (heavy duty)	6	5	6	9	9	do.	5/8	12-1/2

[1] Without abrasive wheel, wheel guard, or wheel flange.

3.21 Workmanship. The grinder and accessories shall be free from all imperfections which may adversely affect the general appearance function, or serviceability.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract or purchase order, the supplier is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified, the supplier may utilize his own facilities or any commercial laboratory acceptable to the Government. The Government reserves the right to perform any of the inspections set forth in the specification where such inspections are deemed necessary to assure that supplies and services conform to prescribed requirements.

4.1.1 *Inspection of materials and components.* In accordance with 4.1, the supplier is responsible for insuring that materials and components used were manufactured, tested, and inspected in accordance with the requirements of referenced subsidiary specifications and standards to the extent specified herein, or, if none, in accordance with this specification.

4.2 Qualification testing. Qualification testing shall be conducted at a laboratory satisfactory to the Bureau of Ships. Qualification tests shall consist of the tests specified in 4.3. Tests shall be conducted on each type and size of grinder for which qualification is desired. Application for qualification tests shall be made in accordance with "Provisions Governing Qualification" (see 6.3).

4.3 Qualification tests.

4.3.1 *Service test.* Upon satisfactory completion of the examination specified in 4.5 and the performance tests specified in 4.6, the grinder shall satisfactorily complete 150 hours of actual work under practical service conditions. The test shall determine the ease of operation, general serviceability, and durability of the tool. Failure during the service tests of any components of the tool, exclusive of abrasive wheels, sanding discs, and wire brushes, shall be cause for failing the qualification test.

4.3.2 *Examination after service test.* Upon completion of the service test, the tool shall be disassembled and the various parts examined. Any tools having broken, cracked, or deformed parts shall be cause for failing the qualification tests. Tools satisfactorily completing the service test shall again be subjected to the performance tests specified in 4.6.

4.4 Quality conformance inspection procedures. Sampling procedures shall be in accordance with MIL-STD-105. Data for sampling shall be as stated in table IV.

4.5 Examination.

4.5.1 *Visual examination.* Each sample unit shall be examined for any nonconformance in design, material, finish, coating, construction, workmanship, and marking. Defects are listed in table V.

TABLE IV. *Sampling data*

Category	Sample unit	Inspection level	Acceptable quality level	AQL expressed in terms of	Reference
Visual examination	1 complete grinder or accessories	S-4	2.5	Defects per hundred units	4.5.1
Dimentional and weight examination	1 complete grinder	S-4	4.0	Defects per hundred units	4.5.2
Testing	1 complete grinder	S-2	6.5	Defects per hundred units	4.7
Preparation for delivery	1 grinder prepared for delivery	II	4.0	Defects per hundred units	4.8

TABLE V. *Classification of defects*

	Defects
1	Arbors, guards, and flanges do not conform to ASA Safety Code.
2	Type and size not as specified.
3	Grinder not readily adjustable or parts not readily replaceable.
4	Motor not rotary vane type.
5	Material nonconforming; evidence of unauthorized material used.
6	Lubricated parts enclosure nonconforming.
7	Nuts or bolts not secured by a suitable locking device.
8	Component part missing.
9	Similar parts not dimensionally and functionally interchangeable.
10	Air inlet connection not as specified, damaged, or missing.
11	Air strainer missing or damaged, not readily removable.
12	Nameplate nonconforming, illegible, incorrect, or missing.
13	Handles not as specified, or damaged.
14	Throttle nonconforming, not type specified, damaged, inoperable, or missing.
15	Spindle not as specified, dimensioning not within specified tolerances.
16	Rotor nonconforming or damaged.
17	Bearings not as specified, broken, cracked, or pitted.
18	Lubrication of grinder not as specified; evidence of oil leakage.
19	Method of drive nonconforming.
20	Accessories or extra equipment not as specified.

4.5.2 *Dimensional and weight examination.* Each sample unit shall be examined for any nonconformance with dimensional and weight requirements.

4.6 Test procedures.

4.6.1 *Performance test conditions.* All performance tests shall be based on operation of the tools with compressed air at a gage pressure of 90 pounds p.s.i., measured as close to the grinder as practicable. Test tools shall be connected to the air supply by means of a 10-foot length of 5/8-inch inside diameter hose provided at the tool end with a coupling conforming to table VI.

TABLE VI. *Coupling requirements*

Air inlet connection nominal pipe size	Inside diameter of hose coupling
Inch	*Inch*
1/4	0.250
3/8	.375
1/2	.500

4.6.2 *Air consumption, speed and torque.* Grinders shall be subjected to a test to determine compliance with the requirements for air consumption, speed, and torque. The speed test shall also verify compliance with 3.15.

4.7 Examination of preparation for delivery. An examination shall be made to determine that preservation, packing, and marking as required by section 5 are complied with. Defects shall be scored as specified in the following table.

Examine	Defects
Markings (exterior and interior)	Omitted; incorrect; illegible; or improper size, location, sequence, or method of application.
Preservation	Preservative improperly applied or missing.
Weight	More than specified.
Workmanship	Loose strapping, flaps not sealed.

5. PREPARATION FOR DELIVERY

5.1 Preservation, packaging, and packing. Grinders shall be preserved, packaged, and packed in accordance with MIL-P-12829, as specified for the applicable level.

5.2 Marking.

5.2.1 *Military requirements.* Interior packages and shipping containers shall be marked in accordance with MIL-STD-129.

5.2.2 *Civil agency requirements.* Interior packages and shipping containers shall be marked in accordance with Fed. Std. No. 123.

6. NOTES

6.1 Intended use.

6.1.1 *Type I.* Type I, horizontal grinders shall be suitable for grinding with a

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straight-type, hard, organic bond abrasive wheel and shall be suitable for use with radial-type and cup-type wire brushes. The 2- and 2-1/2-inch size grinders shall be used primarily for close quarter and internal work, such as in grinding the inside of welded pipe flanges, small radii, and corners. The 4-, 6-, and 8-inch size grinders shall be used primarily for grinding rough edges of plates, shapes, and castings.

6.1.2 *Type II.* Type II, vertical grinders shall be suitable for grinding and snagging with cup-type or depressed center abrasive wheels, and for use of cup-type brushes and sanding discs.

6.2 Ordering data. Purchasers should select the preferred options offered herein and include the following information in procurement documents:

(*a*) Title, number, and date of this specification.
(*b*) Type and size required (see 1.2.1 and tables I and III, as applicable).
(*c*) Accessories or extra equipment required (see 3.19).
(*d*) When belt grinding attachment is required and length and width of belt accommodated (see 3.19.1).
(*e*) Type of throttle required if different (see 3.17.3 and 3.18.3).
(*f*) Selection of applicable levels of preservation, packaging, and packing (see 5.1).
(*g*) Marking requirements (see 5.2).

6.3 With respect to products requiring qualification, awards will be made only for such products as have, prior to the time set forth for opening of bids, been tested and approved for inclusion in Qualified Products List (QPL) OO-G-669, whether or not such products have actually been so listed by that date. The attention of the suppliers is called to this requirement, and manufacturers are urged to arrange to have the products that they propose to offer to the Federal Government tested for qualification, in order that they may be eligible to be awarded contracts or orders for the products covered by this specification. The activity responsible for the qualified products list is the Naval Ship Engineering Center, Department of the Navy, Washington, D.C., 20360, and information pertaining to qualification of products may be obtained from that activity. Application for qualification tests shall be made in accordance with "Provisions Governing Qualification." (Copies may be obtained from the Commanding Officer, Naval Supply Depot, 5801 Tabor Ave., Philadelphia, Pa., 19120.)

MILITARY CUSTODIANS:

Army—GL
Navy—SH
Air Force—69

Review activities:

Army—GL
Navy—SH, YD
Air Force—69

User activity:

Army—MO, WC

Preparing activity:

GSA—FSS

☆ U.S. GOVERNMENT PRINTING OFFICE: 1967--253354/264

Orders for this publication are to be placed with General Services Administration, acting as an agent for the Superintendent of Documents. See section 2 of this specification to obtain extra copies and other documents referenced herein. Price 5 cents each.

OO-D-691d
February 28, 1967
SUPERSEDING
Int. Fed. Spec. OO-D-00691c (GSA-FSS)
May 12, 1965 and
Fed. Spec. OO-D-691a
November 5, 1957

FEDERAL SPECIFICATION

DRILL, PNEUMATIC, PORTABLE; AND BORER, WOOD, PNEUMATIC

This specification was approved by the Commissioner, Federal Supply Service, General Services Administration, for the use of all Federal agencies.

1. SCOPE AND CLASSIFICATION

1.1 Scope. This specification covers portable pneumatic drills and pneumatic wood borers, for drilling holes in medium steel and in wood, that are most generally used by the Federal Government.

1.2 Classification.

1.2.1 Types and styles. Portable pneumatic drills and pneumatic wood borers shall be of the following types and styles, as specified (see 6.2):

Type I—Drills.
  Style A—90° angle head.
  Style B—360° angle head.
  Style C—Straight drive.
Type II—Wood borers.
Type III—Corner drills.

2. APPLICABLE DOCUMENTS

2.1 Specifications and standards. The following specifications and standards, of the issues in effect on date of invitation for bids, or request for proposal, form a part of this specification to the extent specified herein:

Federal Specification:

GGG-C-350—Chuck, Drill; and Arbors and Keys, Drill Chuck.

Federal Standard:

Fed.-St. No. 123—Marking for Domestic Shipment (Civilian Agencies).

(Activities outside the Federal Government may obtain copies of Federal Specifications, Standards, and Handbooks as outlined under General Information in the Index of Federal Specifications and Standards and at the prices indicated in the Index. The Index, which includes cumulative monthly supplements as issued, is for sale on a subscription basis by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

(Single copies of this specification and other product specifications required by activities outside the Federal Government for bidding purposes are available wthout charge at the General Services Administration Regional Offices in Boston, New York, Washington, D.C., Atlanta, Chicago, Kansas City, Mo., Dallas, Denver, San Francisco, Los Angeles, and Seattle, Wash.

(Federal Government activities may obtain copies of Federal Specifications, Standards, and Handbooks and the Index of Federal Specifications and Standards from established distribution points in their agencies.)

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Military Specification:

MIL-P-12829—Packaging of Pneumatic Hand Tools with Attachments and Accessories.

Military Standards:

MIL-STD-105—Sampling Procedures and Tables for Inspection by Attributes.

MIL-STD-129—Marking for Shipment and Storage.

(Copies of Military Specifications and Standards required by contractors in connection with specific procurement functions should be obtained from the procuring activity or as directed by the contracting officer.)

2.2 Other publications. The following documents form a part of this specification to the extent specified herein. Unless otherwise indicated, the issue in effect on date of invitation for bids or request for proposal shall apply.

National Bureau of Standards NBS Handbook:

H28—Screw Thread Standards for Federal Services.

(Application for copies should be addressed to the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C., 20402.)

American Standards Association (ASA) Publication:

B5-10—Machine Tapers; Self-Holding and Steep Taper Series.

(Copies may be obtained from the American Standards Associations, 70 E. Forty-fifth St., New York 7, N. Y.)

(Technical society and technical association specifications and standards are generally available for reference from libraries. They are also distributed among technical groups and using Federal agencies.)

3. REQUIREMENTS

3.1 Illustrations. The illustrations shown herein are descriptive and not restrictive, and are not intended to preclude the purchase of drills and borers otherwise conforming to this specification.

3.2 Qualification. Drills and borers furnished under this specification shall be products which have been tested and passed the qualification tests specified herein, and have been listed on or approved for listing on the applicable qualified products list.

3.3 Material. Material used in the construction of drills and borers shall be of a good commercial quality suitable for the intended purpose. All materials used shall be free from defects and imperfections that may adversely affect the serviceability of the finished product.

3.4 Interchangeability. All parts having the same manufacturer's part number shall be constructed to definite standards, tolerances, and clearance in order that such parts may be completely interchangeable and may be replaced or adjusted without requiring modification.

3.5 Screw threads. All threaded parts, including screws, bolts, and nuts, shall conform to the applicable requirements of NBS H28.

3.6 Identification of product. Drills and borers shall be marked in accordance with manufacturer's standard practice so that the part number and source of manufacture can be easily determined.

3.7 Lubrication.

3.7.1 Primary lubrication. Drills and borers shall be furnished with an oil reservoir. The oil reservoir shall be of sufficient capacity so that one filling will supply lubrication to the rotor, cylinder, and other moving parts in the path of the air stream for at least 8 hours of continuous operation. The oil shall be fed from the reservoir by an automatic device that functions through an action dependent upon the operation of the drill or borer. The oil flow shall be regulated so that lubrication will be sufficient without excessive quantities of lubricant being discharged with the exhaust air.

3.7.2 Secondary lubrication. When required, conventional type lubrication fittings or openings or other suitable means shall be provided for introduction of sufficient lubricant for bearings, gears, and other moving parts not lubricated from the oil reservoir. Lubrication shall be required only once in not less than 48 hours of actual operation. No external means of lubrication shall be required for prelubricated sealed bearings.

3.8 Air inlet connection. The air inlet connection shall consist of a well secured ferrous fitting threaded with internal American standard taper pipe threads (NPT) or internal dryseal American standard taper pipe threads (NPTF). The air inlet shall be fitted with an air strainer or screen (20 mesh or finer) which shall effectively retain solid particles in the compressed air supply. The strainer or screen shall be of such design that it can be easily removed for cleaning.

3.9 Bearings. Except as otherwise specified herein, all rotating parts shall be provided with commercially available bearings. Roller bearings, which are designed primarily for radial loads, shall not be used in a thrust position. Open type (needle) bearings shall be suitably housed and sealed to prevent leakage of lubricant and entrance of dirt and dust. If sleeve bearings are used, they shall be the sintered, metal powder, oil-impregnated type.

3.10 General construction. Drills and borers shall be of rugged construction so as to withstand, without failure, treatment likely to be encountered under general service conditions. Drills and borers shall be self contained, readily accessible for adjustment or replacement of parts. Parts which require lubrication shall be properly enclosed so as to prevent entrance of foreign particles and leakage of lubricant. Working parts exposed to wear shall be of sufficient hardness to withstand the service required. Parts shall be properly finished by machining or grinding to dimensions within limits established by good commercial practice. Drills and borers shall be reliable and effective when operated on compressed air lines at gage pressures between 80 and 100 pounds per square inch p.s.i. Reversible drills and borers shall be furnished with a conveniently located mechanism for reversing the rotation of the spindle.

3.11 Housing. Housings shall be strong enough to prevent breakage or indentation under service conditions. When threaded fasteners are utilized to assemble adjacent housing components, through bolting shall be used in preference to tapped holes. Cap screws, if used, shall engage threads in ferrous housings or ferrous inserts in nonferrous housings by not less than a length equal to the pitch diameter of the fastener thread. Where ferrous inserts are not used in nonferrous housings, cap screws shall engage threads by not less than a length equal to 1-1/2 times the pitch diameter of the fastener thread. All threaded fasteners shall be secured with suitable locking devices.

3.12 Motor. The motor shall be of the rotary vane type. The rotor of the motor shall consist of one or more elements accurately balanced with the rotor shaft and shall be propelled by compressed air through the attendant action of vanes or blades made of suitable composition.

3.13 Speed. The no-load speed of the drills and borers shall be automatically regulated, consistent with the requirements stated herein. There shall be no abrupt or erratic speed variations affecting drilling and boring operations when tested in accordance with 4.8.

3.14 Handles. The handles of drills and borers shall be as specified herein.

3.15 Throttle. Drills and borers shall be provided with a nonleakable manual throttle for admitting and shutting off the supply of compressed air, and for gradually regulating the speed of the tool. The throttle of drills and borers shall be as specified herein.

→ NOISE SUPPRESSION

3.16 Spindle. Taper spindles shall conform to ASA B5-10 for the size specified herein for drills and borers, as applicable. The spindle for drills and borers shall be as specified herein.

3.17 Type I drills. Type I drills shall be suitable for drilling holes in medium steel with the size high speed twist drill of a diameter corresponding to the size of the drill. Unless otherwise specified

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(see 6.2), the drills shall be nonreversible, shall conform to the requirements in table I for the size specified (see 6.2), and shall conform to performance characteristics specified in table II. Reversible drills shall conform to the performance characteristics specified in table II, except that the speed at specified torque shall be determined by multiplying a factor of 3/5 to the value specified and the air consumption at specified torque shall be determined by multiplying a factor of 5/3 to the specified value (in both directions).

Table I. Type I drills, sizes, and capacities

Size	At spindle	Air inlet connection nominal pipe size	Weight (max.)
		Inch	Pounds
1/4-high speed	1/4-inch chuck[1]	1/4	4-1/4
1/4-medium speed	1/4-inch chuck[1]	1/4	6
1/4-low speed	1/4-inch chuck[1]	1/4	6
3/8-high speed	3/8-inch chuck[1]	1/4	8
3/8-medium speed	3/8-inch chuck[1]	1/4	8
1/2	No. 2 ASA Morse taper socket	1/2 or 3/8	15[2]
7/8	No. 3 ASA Morse taper socket	1/2 or 3/4	26
1-1/4	No. 4 ASA Morse taper socket	1/2 or 3/4	39
2	No. 5 ASA Morse taper socket	3/4 or 1	45
3	No. 5 ASA Morse taper socket	3/4 or 1	85

[1] For type of spindle on which chuck is mounted, see 3.17.6.1.

[2] If furnished with chuck, add 2 pounds.

Table II. Type I drills—performance characteristics

Size of drill	Specified torque	At specified torque		At no load	
		Speed (min.)	Air consumption (max.)	Speed (max.)	Air Consumption (max.)
Inches	Ft. lbs.	R.P.M.	Cu. ft./min./h.p.	R.P.M.	Cu. ft./min.
1/4-high speed	0.75	1,400	70	3,200	26
1/4-medium speed	2.0	950	65	2,200	38
1/4-low speed	2.6	500	40	1,000	30
3/8-high speed	2.5	700	75	1,600	35
3/8-medium speed	6.0	450	65	900	40
1/2	10	500	40	1,000	35
7/8	30	300	35	500	35
1-1/4	50	290	37	450	60
2	80	150	37	300	60
3	200	100	38	150	80

3.17.1 Style A, 90° angle head. Style A drills shall be furnished with a 90° angle head and shall be similar to figure 1.

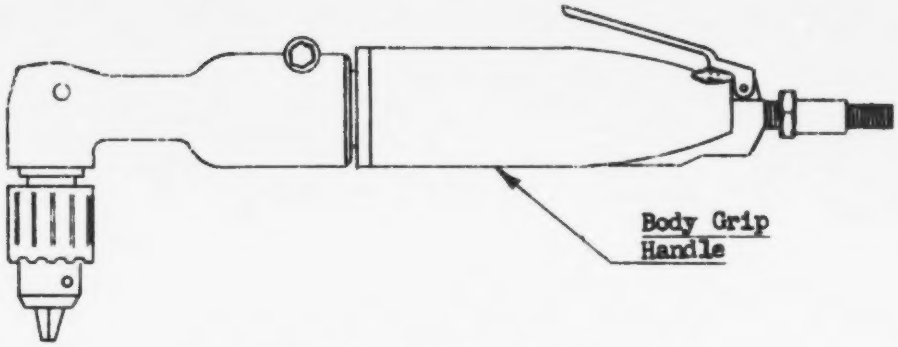
Body Grip
Handle

Figure 1. Type I, style A, 90° angle head drill.

3.17.2 Style B, 360° angle head. Style B drills shall be furnished with an adjustable 360° angle head in the 1/4-inch size only, and shall be similar to figure 2.

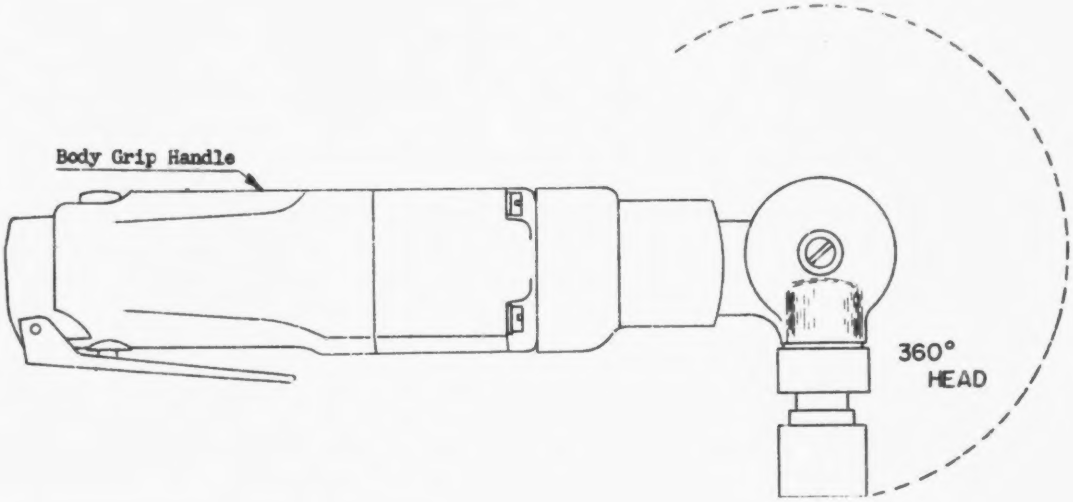
Body Grip Handle
360°
HEAD

Figure 2. Type I, style B, 360° angle head drill.

3.17.3 Style C, straight drive. Style C drills shall be similar to figure 3. The 1/2-inch and larger drills shall be similar to figure 4.

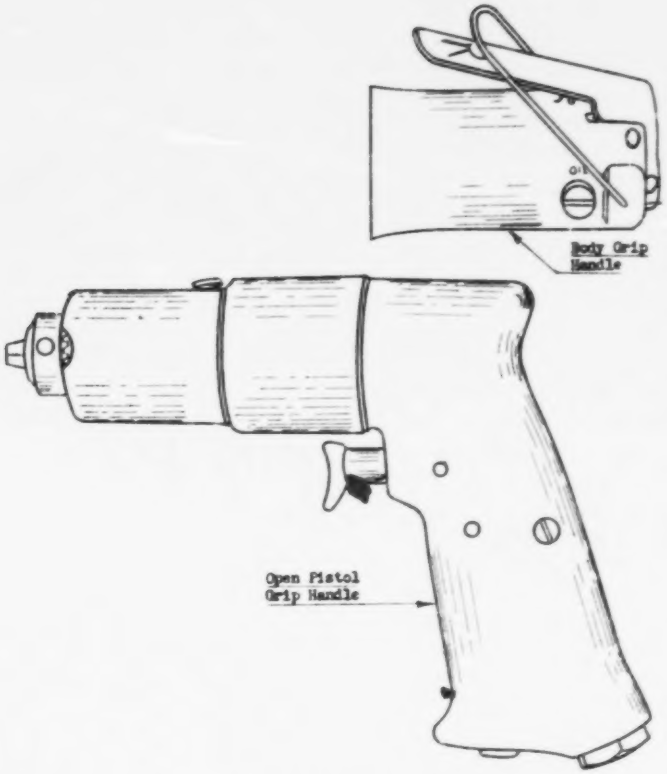

Figure 3. Type I, style C, straight drive drill, ¼- and ⅜-inch sizes.

3.17.4 Handles. Drills of 1/4- and 3/8-inch sizes shall be equipped with open pistol grip or body grip handles, as specified (see 6.2). Drills 1/2-inch size and larger shall have "live" handle and a "dead" handle secured to opposite sides of the housing perpendicular to the spindle axis. The "live" handle shall be provided at its outer end with an air inlet connection, as specified in table I. The "dead" handle shall be removable for operation in confined spaces.

3.17.5 Throttles. Drills of the 1/4-, 3/8-, and 1/2-inch sizes shall be provided with trigger, button, or lever style throttles. Drills 1/2-inch size and larger shall be provided with a lever or sleeve style throttle on the live handle.

3.17.6 Spindles (styles A and C).

3.17.6.1 Sizes 1/4- and 3/8-inch. Nonreversible 1/4-inch size drills shall be furnished with a 3/8-24 threaded spindle. Reversible 1/4 inch size drills shall be furnished with a number 1 male jacob taper spindle. Nonreversible 3/8 inch drills shall be furnished with a 1/2-20 threaded spindle. Reversible 3/8-inch size drills shall be furnished with a number 2 male jacob taper spindle.

3.17.6.2 Sizes 1/2-inch and larger. The drills shall be furnished with spindles having standard ASA Morse taper sockets as shown in table I.

3.17.7 Chucks.

3.17.7.1 Styles A and C, 1/4- 3/8-, and 1/2-inch sizes. The 1/4- and 3/8-inch size drills shall be furnished with medium duty (minimum) chucks, in accordance with GGG-C-350, type I, class 1

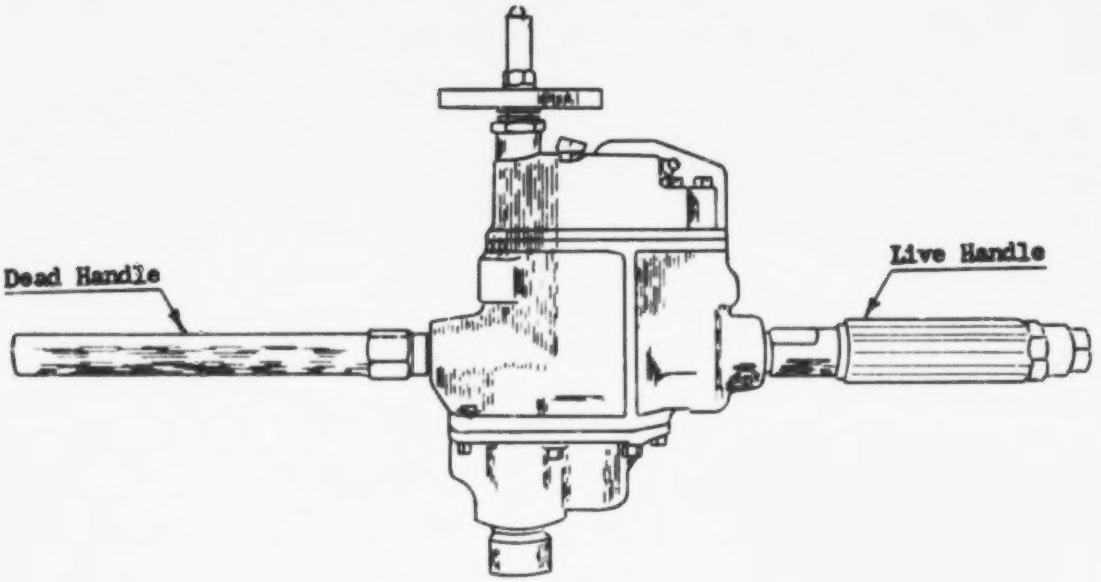

Figure 4. Type I, style C, straight drive drill, ½-inch size and larger.

or 2, as applicable (see 3.17.6.1). When specified (see 6.2), the 1/2-inch size shall be furnished with a medium duty (minimum) chuck in accordance with GGG-C-350, (size as specified).

3.17.7.2 Style B. The style B drill shall be furnished with a miniature, special-purpose, jaw-type chuck, with a 1/4-inch capacity. The chuck shall be capable of securely gripping standard straight-shank drills within its capacity. Suitable means shall be provided for manually loosening and tightening the drill chuck.

3.17.8 Feed screw. Unless otherwise specified (see 6.2), drills of 1/2-inch size and larger shall be equipped with feed screws having four radiating arms for handfeed control. The feed screw shall be of such design that it cannot be unintentionally screwed entirely out of the body of the drill. The feed screws shall be of such construction that there will be no unsteadiness when the drill is operated with the feed screw at its maximum extension. The end of the feed screw projecting into the body of the drill shall be fitted with an ejector for forcing tools out of the socket by turning the feed screw handle. Drills equipped with a socket external to the body of the drill shall have tool ejection accomplished by means of a driftpin. The outer or external end of the feed screws shall be fitted with a hardened steel center.

3.18 Type II wood borers. Wood borers shall be suitable for boring holes in dry, well seasoned oak hardwood with the maximum size of wood bit, in inches, corresponding to the rated size of the wood borer, when operated at an air pressure of 90 pounds p.s.i. Wood borers shall be reversible and shall be similar to figure 5, and shall conform to table III, in both directions.

3.18.1 Handles. Wood borers shall be equipped with a "live" handle, a "dead" handle, and a spade or breast handle. The "live" and "dead" handles shall be secured to opposite sides of the housing, perpendicular to the spindle axis. The "live" handle shall be provided at its outer end with an air inlet connection on nominal pipe size, as specified in table III. The "dead" handle shall be removable. The spade or breast handle shall be located at the end of the housing opposite the chuck and suitably in line with the axis of the chuck.

3.18.2 Throttle. Wood borers shall be provided with lever or sleeve style throttles on the "live" handle.

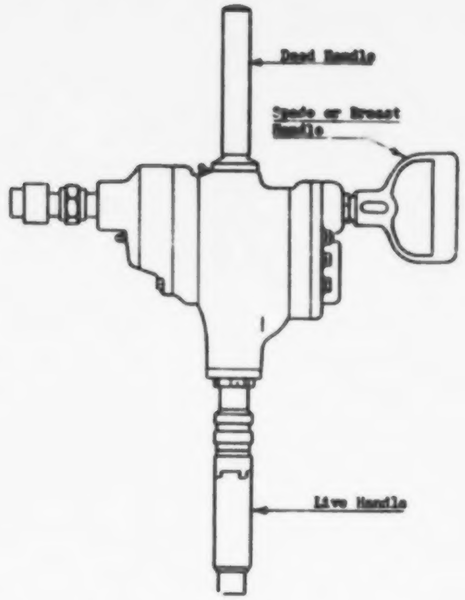

Figure 5. Type II, wood borers.

Table III. Type II, wood borers:
Dimensions and performance characteristics

Size	Chuck size for wood-bit shanks (Dia.)	At no-load		Horsepower (min.)	Air inlet connection nom. pipe size	ASA Morse taper socket in spindle	Weight (max.)
		Speed (max.)	Air consumption (max.)				
Inches	Inch	R.p.m.	C.f.m.		Inch	Number	Pounds
1	1/2	1,000	35	3/4	1/2	2	17
2	1/2	850	85	1-1/2	1/2 or 3/4	2	35
4	1/2	500	85	2	1/2 or 3/4	3	35

3.18.3 Spindle. Wood borers shall be equipped with spindles having standard A.S.A. (Morse) taper sockets of the sizes shown in table III, threaded externally on its outer end in accordance with the manufacturer's standard practice, and shall be furnished with hucks suitable for retaining shanks of the sizes shown in table III.

3.19 Type III corner drills. Corner drills shall be suitable for use in close places where an ordinary drill cannot be operated. Corner drills shall be constructed with the spindle at one end and the motor at the opposite end of the housing. Corner drills shall be similar to figure 6 and shall conform to the dimensions in table IV for the size specified (see 6.2). Corner drills shall be reversible and shall conform to the performance characteristics specified in table V, in both directions, and shall be furnished with a feed screw.

3.19.1 Handle. Corner drills shall be equipped with a "live" handle suitably in line with the longitudinal axis of the air motor and at the opposite end of the housing from the spindle. The handle shall be provided at its outer end with an air inlet connection of nominal pipe size, as specified in table IV.

3.19.2 Throttle. Corner drills shall be provided with a lever or sleeve style throttle on the "live" handle.

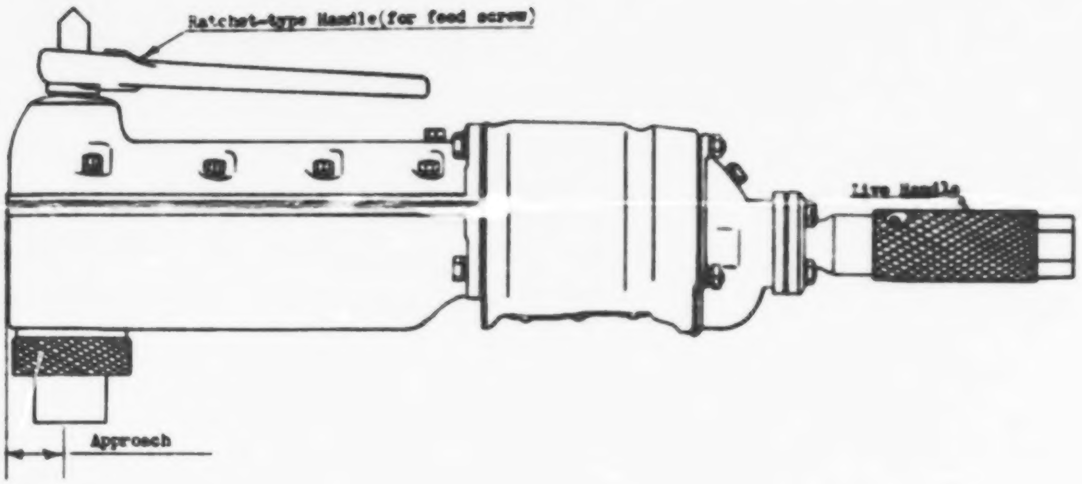

Figure 6. Type III, corner drills.

Table IV. Type III corner drills—dimensions

Size	A.S.A. (Morse) taper socket in spindle	Air inlet connection nominal pipe size	Weight (max.)	Approach (max.)
	Number	Inch	Pounds	Inches
7/8	3	1/2 or 3/4	40	1-9/16
1-1/4	4	1/2 or 3/4	50	1-9/16
3	5	1/2 or 3/4	60	2-3/8

3.19.3 Spindle. Corner drills shall be equipped with spindles having standard A.S.A. (Morse) taper sockets of the sizes shown in table IV.

3.19.4 Feed screw. Feed screws furnished with the corner drills shall conform to 3.17.8, except that the feed screw shall be actuated by a reversible ratchet-type handle or other suitable mechanism, operable within the width of the drill body, for hand-feed control.

Table V. Type III, corner drills—performance characteristics

		At specified torque		At no-load	
Size	Specified torque	Speed (min.)	Air consumption (max.)	Speed (max.)	Air consumption (max.)
Inches	Ft.-lbs.	R.p.m.	Cu. ft./min./hp.	R.p.m.	Cu. ft./min.
7/8	20	180	60	450	45
1-1/4	40	135	55	300	65
3	100	90	45	150	65

3.20 Accessories or extra equipment. When accessories or extra equipment are required, they shall be as specified (see 6.2).

3.21 Instruction book. One copy of an instruction book consisting of the manufacturer's standard commercial instructions and parts list, bound together, shall be furnished with each drill and borer.

3.22 Workmanship. Drills and borers shall be of the best quality, free from imperfections which will adversely affect their general appearance, function, or serviceability.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract or purchase order, the supplier is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified, the supplier may utilize his own facilities or any commercial laboratory acceptable to the Government. The Government reserves the right to perform any of the inspections set forth in the specification where such inspections are deemed necessary to assure that supplies and services conform to prescribed requirements.

4.1.1 Inspection of materials and components. In accordance with 4.1, the supplier is responsible for insuring that materials and components used were manufactured, tested, and inspected in accordance with the requirements of referenced subsidiary specifications and standards to the extent specified herein, or, if none, in accordance with this specification.

4.2 Qualification testing. Qualification testing shall be conducted at a laboratory satisfactory to the Bureau of Ships. The tests shall consist of the visual, dimensional, and weight examination of 4.4.1 and 4.4.2, the performance tests of 4.7, followed by the qualification tests of 4.8. After satisfactory completion of the tests of 4.8, the drill or borer shall be disassembled and the various parts examined. Any part broken, cracked, or deformed shall be cause for rejection. The drill or borer shall then be reassembled and again subjected to the tests of 4.7. Tests shall be conducted on nonreversible and reversible drills of each type, style, and size and on each size of borer for which qualification approval is desired. Application for qualification tests shall be made in accordance with "Provisions Governing Qualification" (see 6.3).

4.3 Quality conformance inspection.

4.3.1 Inspection lot. Drills and borers of the same type, style, and size shall be considered a lot for the purpose of quality conformance inspection.

4.3.2 Sampling procedures. Sampling procedures shall be in accordance with MIL-STD-105. Data for sampling shall be as stated in table VI.

4.4 Examination.

4.4.1 Visual examination. Each sample unit shall be examined for any nonconformance in design, material, finish, coating, construction, workmanship, and marking. Defects are listed in table VII.

00-D-691d
INTERIM AMENDMENT-6 (GSA-FSS)
December 28, 1970
SUPERSEDING
Interim Amendment-5 (NAVY-Ships)
May 15, 1970

INTERIM AMENDMENT

TO

FEDERAL SPECIFICATION

DRILL, PNEUMATIC PORTABLE; AND BORER, WOOD, PNEUMATIC

This Interim Amendment was developed by the Standardization Division, Federal Supply Service, General Services Administration, Washington, D. C. 20406, based upon currently available technical information. It is recommended that Federal agencies use it in procurement and forward recommendations for changes to the preparing activity at the address shown above.

The General Services Administration has authorized the use of this Interim Amendment as a valid exception to Federal Specification 00-D-691d.

PAGE 1

Paragraph 2.1, under "Federal Specification": Add "PPP-P-40 Packaging and Packing of Hand Tools."

PAGE 2

Paragraph 2.1: Delete "Military Specification" and "MIL-P-12829".

Paragraph 2.2 Other publications. Add the following:

"CAGI-PNEUROP Test Code for the Measurement of Sound from Pneumatic Equipment.

(Copies may be obtained from Compressed Air and Gas Institute, 122 East 42nd Street, New York, New York 10017)."

Paragraph 3.2: Delete and substitute:

"3.2 Qualification. Drills and borers furnished under this specification shall be products which are qualified for listing on the applicable qualified products list at the time set for opening of bids (see 4.2 and 6.3)."

Paragraph 3.3: Delete and substitute:

"3.3 Materials. The materials used in the construction of items and components shall be sound, of uniform quality and condition and shall conform in composition, heat treatment and suitability to the standard practices of manufacturers producing tools of the types required in this specification. Equipment and parts shall be new and high grade commercial quality."

PAGES 2 and 3

Paragraphs 3.7, 3.7.1 and 3.7.2: Delete and substitute:

"3.7 Lubrication. The drills and borers shall be designed so that oil may be applied to all components that require lubrication. Provisions shall be made for the oil to be manually applied directly into the tool or automatically supplied through the air pressure line."

FSC 5130

PAGE 3

Add the following:

"3.10.1 Sound pressure levels. The sound pressure levels measured at an unobstructed distance of one meter, shall not exceed the following limits on the A weighted scale in any microphone location (see 4.7.1):

90 dbA ----- Type I, styles A, B, and C in sizes 1/2 inch and smaller.
100 dbA ----- Type I, styles A, B, and C in sizes 7/8 inch and larger; type II; and type III."

PAGE 4

Table I: Delete and substitute:

TABLE I. Type I drills, sizes, and capacities

Size	At spindle	Air inlet connection nominal pipe size	Weight (max.)
1/4-high speed	1/4-inch chuck[1]	1/4	4-1/4
1/4-medium speed	1/4-inch chuck[1]	1/4	6
1/4-low speed	1/4-inch chuck[1]	1/4	6
3/8-high speed	3/8-inch chuck[1]	1/4	8
3/8-medium speed	3/8-inch chuck[1]	1/4	8
1/2-pistol grip	1/2-inch chuck	1/4 or 3/8	12
1/2	No. 2 ASA Morse taper socket	1/2 or 3/8	15[2]
7/8	No. 3 ASA Morse taper socket	1/2 or 3/4	30
1-1/4	No. 4 ASA Morse taper socket	1/2 or 3/4	39
2	No. 5 ASA Morse taper socket	3/4 or 1	45
3	No. 5 ASA Morse taper socket	3/4 or 1	85

[1] For type of spindle on which chuck is mounted, see 3.17.6.1.
[2] If furnished with chuck, add 2 pounds.

Table II: Delete and substitute:

TABLE II. Type I drills--performance characteristics

Size of drill	Specified torque	At specified torque		At no load	
		Speed (min.)	Air consumption (max.)	Speed (max.)	Air consumption (max.)
Inches	Ft. Lbs.	R.P.M.	Cu. Ft./min./h.p.	R.P.M.	Cu. Ft./min.
1/4-high speed	0.75	1,400	70	3,200	26
1/4-medium speed	2.0	950	65	2,200	38
1/4-low speed	2.6	500	55	1,000	30
3/8-high speed	2.5	700	75	1,600	35
3/8-medium speed	6.0	450	65	900	40
1/2	10	500	40	1,000	35
1/2 (pistol grip)	8	450	45	1,200	40
7/8	30	300	35	500	35
1-1/4	50	290	37	450	60
2	80	150	37	300	60
3	200	100	38	150	80

PAGE 5

Paragraph 3.17.3: Delete and substitute:

"3.17.3 Style C, straight drive. Style C drills shall be similar to figure 3. Unless otherwise specified (see 6.2), the 1/2-inch and larger drills shall be similar to figure 4. When specified (see 6.2), 1/2-inch drills shall be similar to figure 3 with pistol grip live handle forward of position illustrated. (This option negates spindle requirement of table I and the throttle requirements specified in 3.17.5 when exercised)."

PAGE 6

Paragraph 3.17.6.2: Delete and substitute:

"3.17.6.2 Sizes 1/2 inch and larger. Unless otherwise specified (see 6.2), the drills shall be furnished with spindles having standard ASA Morse taper sockets as shown in table I. When specified (see 6.2), 1/2-inch size drill spindles shall directly accept a 1/2-inch chuck commercially rated medium duty without the use of an intermediate adapter or shank."

PAGE 10

Table V: Delete and substitute:

TABLE V. Type III, corner drills--performance characteristics

Size	Specified torque	At specified torque		At no load	
		Speed (min.)	Air Consumption (max.)	Speed (max.)	Air Consumption (max.)
Inches	Ft. Lbs.	R.P.M.	Cu. Ft./min./h.p.	R.P.M.	Cu. Ft./min.
7/8	100	180	45	450	55
1-1/4	160	100	45	300	65
3	250	70	45	150	65

Paragraph 4.1: Delete and substitute:

"4.1 Responsibility for inspection. Unless otherwise specified in the contract or purchase order, the supplier is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified in the contract or order, the supplier may use his own or any other facilities suitable for the performance of the inspection requirements specified herein, unless disapproved by the Government. The Government reserves the right to perform any of the inspections set forth in the specification where such inspections are deemed necessary to assure that supplies and services conform to prescribed requirements."

Paragraph 4.2, line 2: Delete "Bureau of Ships" and substitute "Naval Ship Engineering Center".

Paragraph 4.2, last line: Delete "Provisions Governing Qualification" and substitute "Provisions Governing Qualification SD-6".

PAGE 12

Add the following:

"4.7.1 Sound pressure level test. The sound pressure level test shall be conducted in accordance with the applicable provisions of the CAGI-PNEUROP Test Code except as modified herein. The acceptable limits shall be as specified in 3.10.1.

PAGE 12 (CON.)

4.7.1.1 Acoustical calibration. The entire instrumentation system shall be calibrated before each test series allowing a minimum instrument warm-up period of 5 minutes if transistorized and 1/2 hour if vacuum tube. Recalibration shall be performed if any instrument adjustment is necessary during progress of the test. All instrumentation (except microphone) and test personnel shall be as remotely located as practicable so that the measured data will be unaffected by a nonstationary observer.

4.7.1.2 Background sound level. The ambient noise level shall be no greater than 10 db less than the measurement taken with the tool running in all tool and microphone orientations. In addition, the sound produced by the energy absorbing device, used in the "on load" test, must be at least 10 dbA below the machine's own sound output."

Paragraphs 5.1 and 6.2 (g) delete "MIL-P-12829" and substitute "PPP-P-40".

Paragraph 6.1: Add the following:

"Maximum sound pressure levels have been set to insure against occupational noise-induced hearing losses. The tools covered by this specification are considered intermittent duty tools, used in short bursts of 2 minutes duration or less. The exposure time for tool sizes up to and including 1/2 inch is four hours. The larger sizes are considered to be less intermittent and have an exposure time of two hours."

Paragraph 6.2: Add the following:

"(i) Specify when 1/2-inch style C drills shall be similar to figure 3 (see 3.17.3), have a spindle for accepting 1/2-inch drill chucks directly, (see 3.17.6.2) and be furnished with a 1/2-inch chuck commercially rated medium duty."

PAGE 13

Paragraph 6.3: Delete and substitute:

"6.3 With respect to products requiring qualification, awards will be made only for products which are at the time set for opening of bids, qualified for inclusion in applicable Qualified Products List QPL OO-D-691, whether or not such products have actually been so listed by that date. The attention of the suppliers is called to this requirement, and manufacturers are urged to arrange to have the products that they propose to offer to the Federal Government tested for qualification in order that they may be eligible to be awarded contracts or orders for the products covered by this specification. The activity responsible for the Qualified Products List is the Naval Ship Engineering Center, Center Building, Prince George's Center, Hyattsville, Maryland 20782 and information pertaining to qualification of products may be obtained from that activity. Application for Qualification Tests shall be made in accordance with "Provisions Governing Qualification SD-6" (see 6.3.1).

6.3.1 Copies of "Provisions Governing Qualification SD-6" may be obtained upon application to Commanding Officer, Naval Publications and Forms Center, 5801 Tabor Avenue, Philadelphia, Pennsylvania 19120."

Table VI. Sampling data

Category	Sample unit	Inspection level	Acceptable quality level (AQL)	AQL expressed in terms of	Reference
Visual examination	One complete drill or borer	II	1.5	Percent defective	4.4.1
Dimensional and weight examination	"	II	1.5	"	4.4.2
Testing	"	S-4	1.5	Defects per hundred units	4.5
Preparation for delivery	One complete drill or borer prepared for delivery	S-2	4.0	Defects per hundred units	4.6

Table VII. Classification of defects

	Defects
1	Type, style, or size, not specified.
2	Style of handle, not as specified.
3	Drill or borer incomplete, parts missing.
4	Drill or borer, not securely assembled; fasteners, not secured with suitable locking device.
5	Spindle, not as specified.
6	Chuck, not as specified.
7	Marking missing, illegible, or incorrect.
8	Drill or borer, not provided with secondary lubrication fittings or primary lubrication device.
9	Air-inlet connection damaged or not as specified.
10	Air strainer damaged, missing, or not easily removable.
11	Handles, not removable when required.
12	Throttle, not as specified.
13	Material poor quality, defective, or unsuited for purpose intended.
14	Like parts from same manufacturer not interchangeable.
15	Bearings, not as specified or not adequately-protected from dirt and foreign matter.
16	Poor workmanship in fabrication.
17	Tapped holes under minimum depth specified or not reinforced, as applicable.

Table VIII. Classification of preparation for delivery defects

Examine	Defects
Markings (exterior and interior)	Omitted; incorrect; illegible; improper size, location, sequence, or method of application.
Materials	Any component missing or damaged.
Workmanship	Inadequate application of components such as incomplete closure of container flaps, loose strapping, inadequate stapling.
Contents (exterior and interior container)	Distortion of container. Number per container is more or less than required. Net weight exceeds requirements.

4.4.2 Dimensional and weight examination. Each sample unit shall be examined for any nonconformance with dimensional and weight requirements.

4.5 Testing. Each sample unit shall be tested in accordance with 4.7.

4.6 Inspection of preparation for delivery. The preservation, packaging, packing, and marking shall be examined for conformance with the requirements of section 5. (See tables VI and VIII.)

4.7 Performance tests. All performance tests shall be based on operation of the tools with compressed air at a gage pressure of 90 pounds p.s.i. measured as close to the tool as practicable. The tools shall be tested for air consumption, speed, torque, and horsepower, as specified in the applicable table. The tests shall also determine compliance with the throttle, rotational, and reversability action, as applicable. The test tools shall be connected to the air supply by means of a 10-foot length of 5/8-inch inside diameter hose.

4.8 Qualification tests.

4.8.1 Types I and III drills. The drills shall be tested by actual drilling, for 150 hours, medium steel using the maximum size high speed twist drill corresponding to the rated size of the drill. The medium steel test material shall have a minimum Brinell hardness of 112, and shall be 1-inch thick when testing the 1/4-, 3/8-, 1/2-, and 7/8-inch size drills; and 1-1/2-inch thick when testing drills that are 1-12 inch size and larger.

4.8.2 Type II, wood borers. The borers shall be tested by actual boring, for 150 hours, dry, well seasoned oak hardwood 1-1/2-inches thick, using the maximum size of wood bit, in inches, corresponding to the rated size of the borer.

5. PREPARATION FOR DELIVERY

5.1 Preservation, packaging, and packing. Preservation, packaging, and packing shall be in accordance with MIL-P-12829. Levels of preservation, packaging, and packing shall be as specified (see 6.2).

5.2 Marking.

5.2.1 Military agencies. In addition to any special marking required by the contract or order (see 6.2), interior packages and shipping containers shall be marked in accordance with MIL-STD-129.

5.2.2 Civil agencies. In addition to any special marking required by the contract or order (see 6.2), interior packages and shipping containers shall be marked in accordance with Fed.-Std. No. 123.

6. NOTES

6.1 Intended use. Pneumatic drills covered by this specification are intended for drilling holes in metal, using twist drills. Wood borers are for use in drilling holes in wood, using wood bits.

6.2 Ordering data. Purchasers should elect the preferred options offered herein and include the following data in procurement documents:

(a) Title, number, and date of this specification.
(b) Type, style, and size of drill or borer required (see 1.2.1 and tables I, III, and IV).
(c) If reversible type I drill is required (see 3.17).
(d) Style of handle grip required for type I drills (see 3.17.4).
(e) If feed screw is not required on type I drills (see 3.17.8).
(f) Accessories or extra equipment, when required (see 3.20).
(g) Applicable levels of preservation, packaging, and packing required (see 5.1, and MIL-P-12829).
(h) Special marking, if required (see 5.2).

6.3 With respect to products requiring qualification, awards will be made only for such products as have, prior to the time set for opening of bids, been tested and approved for inclusion on Qualified Products List OO-D-691, whether or not such products have actually been so listed by that date. The attention of the suppliers is called to this requirement, and manufacturers are urged to arrange to have the products that they propose to offer to the Federal Government tested for qualification, in order that they may be eligible to be awarded contracts or orders for the products covered by this specification. The activity responsible for the qualified products list is the Naval Ship Engineering Center, Department of the Navy, Washington, D. C., 20360, and information pertaining to qualification of products may be obtained from that activity. Application for qualification tests shall be made in accordance with "Provisions Governing Qualification." (Copies may be obtained upon application to Commanding Officer, Naval Supply Depot, 5801 Tabor Ave., Philadelphia, Pa. 19120.)

MILITARY CUSTODIANS:

Army—GL
Navy—SH
Air Force—69

Review activities:

Army—GL, MO
Navy—SH
Air Force—69

User activities:

Army—WC
Navy—MC, YD

Preparing activity:

GSA-FSS

CIVILIAN AGENCIES:

HEW
COM-NBS
VA

U. S. Government Printing Office: 1967.

Orders for this publication are to be placed with General Services Administration, acting as an agent for the Superintendent of Documents. See section 2 of the specification to obtain extra copies and other documents referenced herein. Price 10 cents each.

☆ U. S. GOVERNMENT PRINTING OFFICE : 1967 O - 252-512 (207)

OO-W-891e
August 25, 1967

SUPERSEDING
Int. Fed. Spec. OO-W-00891d(GSA-FSS)
May 13, 1965 and
Fed. Spec. OO-W-891c
December 19, 1963

FEDERAL SPECIFICATION

WRENCH, IMPACT, PNEUMATIC, PORTABLE

This specification was approved by the Commissioner, Federal Supply Service, General Services Administration, for the use of all Federal agencies.

1. SCOPE AND CLASSIFICATION

1.1 Scope. This specification covers portable pneumatic impact wrenches, for tightening and loosening bolts and nuts, that are most generally used by the Federal Government.

1.2 Classification.

1.2.1 Sizes. The wrenches shall be furnished with the following square male drive sizes, as specified (see 3.11 and 6.1):

Size 3/8 (1/4-inch capacity).
Size 1/2 (3/8-inch capacity).
Size 5/8 (5/8-inch capacity).
Size 3/4 (3/4-inch capacity).
Size 1 (1-1/4-inch capacity).
Size 1-1/2 (1-3/4-inch capacity).

2. APPLICABLE DOCUMENTS

2.1 Specification and standards. The following specifications and standards, of issues in effect on date of invitation for bids or request for proposal, form a part of this specification to the extent specified herein.

Federal Standard:
Fed. Std. No. 123 - Marking for Domestic Shipment (Civilian Agencies).

(Activities outside the Federal Government may obtain copies of Federal Specifications, Standards, and Handbooks as outlined under General Information in the Index of Federal Specifications and Standards and at the prices indicated in the Index. The Index, which includes cumulative monthly supplements as issued, is for sale on a subscription basis by the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C., 20402.

(Single copies of this specification and other product specifications required by activities outside the Federal Government for bidding purposes are available without charge at the General Services Administration Regional Offices in Boston, New York, Washington, D. C., Atlanta, Chicago Kansas City, Mo., Ft. Worth, Denver, San Francisco, Los Angeles, and Seattle, Wash.

(Federal Government activities may obtain copies of Federal Specifications, Standards, and Handbooks and the Index of Federal Specifications and Standards from established distribution points in their agencies.)

Military Specification:
MIL-P-12829 - Packaging of Pneumatic Hand Tools with Attachments and Accessories.

Military Standard:
MIL-STD-129 - Marking for Shipment and Storage.

FSC 5130

(Copies of Military Specifications and Standards required by contractors in connection with specific procurement functions should be obtained from the procuring activity or as directed by the contracting officer.)

2.2 Other publications. The following documents form a part of this specification to the extent specified herein. Unless otherwise indicated, the issue in effect on date of invitation for bids or request for proposal shall apply.

National Bureau of Standards (NBS) Handbook:
H28 - Screw-Thread Standards for Federal Services.

(Application for copies should be addressed to the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C., 20402.)

United States of America Standards Institute (USASI) Publication:
B5.38 - 1958 - Driving and Spindle Ends for Portable Air and Electric Tools.

(Copies may be obtained from the United States of America Standards Institute, 10 East 40th Street, New York, N.Y.,10016.)

(Technical society and technical association specifications and standards are generally available for reference from libraries. They are also distributed among technical groups and using Federal agencies.)

3. REQUIREMENTS

3.1 Illustrations. The illustrations shown herein are descriptive, and not restrictive, and are not intended to preclude the purchase of wrenches otherwise conforming to this specification.

3.2 Qualification. Portable pneumatic impact wrenches furnished under this specification shall be a product which has been tested, and passed the qualification tests specified herein, and has been listed on, or approved for listing on the applicable qualified products list.

3.3 Material. Material used in the construction of the wrenches shall be of a good commercial quality suitable for the intended purpose. All materials used shall be free from defects and imperfections that may adversely affect the serviceability of the finished product.

3.4 Screw threads. All threaded parts, including screws, bolts, and nuts, shall conform to the applicable requirements of NBS H28.

3.5 Identification of product. Wrenches shall be marked in a plain and permanent manner, such that the source of manufacture can be easily determined.

3.6 Lubrication.

3.6.1 Primary lubrication. Wrenches shall be provided with an oil reservoir. The oil reservoir shall be of sufficient capacity so that one filling will supply lubrication to moving parts in the path of the air stream for at least 8 hours of continuous operation. The oil shall be fed from the reservoir by an automatic device that functions through an action dependent upon the operation of the wrench. The oil flow shall be regulated so that lubrication will be sufficient without excessive quantities of lubricant being discharged with the exhaust air.

3.6.2 Secondary lubrication. Conventional type lubricating fittings or openings or other suitable means shall be provided for introduction of sufficient lubricant for bearings, gears, and other moving parts not lubricated from the oil reservoir. The fittings and openings shall be such that lubrication is required only once in not less than 48 hours of actual operation. Where acceptable prelubricated sealed bearings are used, no external means of lubrication shall be required for these parts.

3.7 Air inlet connection. The air inlet connection shall consist of a well-secured ferrous fitting threaded with internal American Standard taper pipe threads (NPT) or internal Dryseal American Standard taper pipe threads (NPTF) in sizes specified in table I. The air inlet shall be fitted with an air strainer or screen (20 mesh or finer) which shall be effective in retaining solid particles in the compressed air supply. The strainer or screen shall be of such design that it can be easily removed for cleaning.

This document has been approved
for public release and sale; its
distribution is unlimited.

OO-W-891e
INTERIM AMENDMENT-5(NAVY-Ships)
July 30, 1971
SUPERSEDING[1]
INTERIM AMENDMENT-4(NAVY-Ships)
October 23, 1970

INTERIM AMENDMENT

TO

FEDERAL SPECIFICATION

WRENCH, IMPACT, PNEUMATIC, PORTABLE

This interim amendment was developed by the Department of the Navy, Naval Ship Engineering Center, Center Building, Prince George's Center, Hyattsville, Maryland 20782, based upon currently available technical information. It is recommended that Federal agencies use it in procurement and forward recommendations for changes to the preparing activity at the address shown above.

The General Services Administration has authorized the use of this interim amendment as a valid exception to Federal Specification OO-W-891e.

Page 1

1.2.1: Delete and substitute:

"1.2.1 Sizes. The wrenches shall be furnished with the following square male drive sizes, as specified (see 3.11 and 6.1):

Size 3/8 (1/4-inch capacity), straight drive.
Size 3/8 (1/4-inch capacity), angle drive.
Size 1/2 (3/8-inch capacity), straight drive.
Size 1/2 (3/8-inch capacity), angle drive.
Size 5/8 (5/8-inch capacity).
Size 3/4 (3/4-inch capacity).
Size 1 (1-1/4-inch capacity).
Size 1-1/2 (1-3/4-inch capacity)."

# 2.1: Add:

"Federal Specification:
PPP-P-40 - Packaging and Packing of Hand Tools."

# 2.1: Delete:

"Federal Standard:
Federal Standard No. 123 - Marking for Domestic Shipment (Civilian Agencies).

Military Specification:
MIL-P-12829 - Packaging of Pneumatic Hand Tools with Attachments and Accessories.

Military Standard:
MIL-STD-129 - Marking for Shipment and Storage."

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[1] CHANGES FROM PREVIOUS ISSUE. THE OUTSIDE MARGINS OF THIS DOCUMENT HAVE BEEN MARKED "#" TO INDICATE WHERE CHANGES (DELETIONS, ADDITIONS, ETC.) FROM THE PREVIOUS ISSUE HAVE BEEN MADE. THIS HAS BEEN DONE AS A CONVENIENCE ONLY AND THE GOVERNMENT ASSUMES NO LIABILITY WHATSOEVER FOR ANY INACCURACIES IN THESE NOTATIONS. BIDDERS AND CONTRACTORS ARE CAUTIONED TO EVALUATE THE REQUIREMENTS OF THIS DOCUMENT BASED ON THE ENTIRE CONTENT AS WRITTEN IRRESPECTIVE OF THE MARGINAL NOTATIONS AND RELATIONSHIP TO THE LAST PREVIOUS ISSUE.

FSC 5130

Page 2

2.1: Delete source paragraph for Military Specifications and Military Standards.

2.2: Delete in its entirety all reference to "American Standards Association (ASA) Publications" and substitute the following:

"AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)
ANSI B5.38-1958 - Driving and Spindle Ends For Portable Air and Electric Tools.
ANSI S5.1-1971 - Test Code for the Measurement of Sound from Pneumatic Equipment.

(Application for copies should be addressed to the American National Standards Institute, Inc., 1430 Broadway, New York, New York 10018.)"

3.2 Delete and substitute:

"3.2 Qualification. Portable pneumatic wrenches furnished under this specification shall be products which are qualified for listing on the applicable qualified products list at the time set for opening of bids (see 4.2 and 6.3)."

3.3: Delete and substitute:

"3.3 Materials. The materials used in the construction of items and components shall be sound, of uniform quality and condition and shall conform in composition, heat treatment and suitability to the standard practices of manufacturers producing tools of the types required in this specification. Equipment and parts shall be new and high grade commercial quality."

3.6, 3.6.1, and 3.6.2: Delete and substitute:

"3.6 Lubrication.

"3.6.1 Primary lubrication. Wrenches shall be provided with an oil reservoir, either built-in or of the airline lubricator type. Capacity of the reservoir shall assure metered lubrication of all moving parts in the air stream, from one filling, for a minimum operating period of 8 hours.

"3.6.2 Secondary lubrication. Wrenches requiring periodic lubrication of parts other than those in the air stream shall be provided with external means of applying the required lubricant without disassembling the tool."

Page 3

After 3.10, add the following paragraph as 3.10.1:

"3.10.1 Sound pressure level. The sound pressure level shall not exceed the following decibel limits on the A weighted scale in any prescribed microphone location (see 4.8).

95 dbA	Sizes 1/2 inch and smaller
103 dbA	Sizes 5/8 inch and larger "

Table I: Delete and substitute:

" Table I - Weight, dimensional and performance requirements.

Spindle size	Weight max.	Length max.	Spindle offset max.	Air inlet (NPT-NPTF)[1]	Air consumption[2] at load max.	Time to twist specimen 180° max.
Inches	Pounds	Inches	Inches	Inch	CFM	Seconds
3/8	5	9-1/4	1-1/4	1/4	15	5
1/2	7	10-5/8	1-3/8	1/4	30	5
5/8	12	12	1-5/8	1/4	35	5
3/4	19	16	2	3/8	50	5
1	35	21-1/8	2-1/2	3/8	60	8
1-1/2	73	25-5/8	3	1/2	85	10

"

[1] Other air inlet sizes will be permitted provided adapters are furnished in the sizes which will permit connections of air hoses in accordance with this table.

[2] Air consumption at load measured during test specimen twist test.

Page 6

3.15: Delete and substitute:

"3.15 Angle drive. When specified (see 6.1), the 3/8 and 1/2 inch size wrenches shall be of the angle drive type with the axis of the drive shaft 90° from the axis of the wrench housing. Angle drive wrenches may exceed the length requirements of table I by no more than 4 inches."

3.19, line 1: Delete ("torque)" throughout.

4.1: Delete and substitute:

"4.1 Responsibility for inspection. Unless otherwise specified in the contract or purchase order, the supplier is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified in the contract or order, the supplier may use his own or any other facilities suitable for the performance of the inspection requirements specified herein, unless disapproved by the Government. The Government reserves the right to perform any of the inspections set forth in the specification where such inspections are deemed necessary to assure supplies and services conform to prescribed requirements."

4.2, last line: Delete "Provisions Governing Qualification" and substitute "Provisions Governing Qualification SD-6".

Page 7

4.6.1, line 3: Delete "SAE grade 1" and substitute "plain carbon (1020 series)".

4.6.1, lines 4 and 5: Delete "maximum hardness of 95" and substitute "hardness of 60-70".

Table IV: Delete and substitute:

TABLE IV. Dimensions of test specimens

Spindle size inches	Nominal[1] hex, size A, inches	Overall length B, inches	"C" length, inches, ± 0.005	"D" diameter, inch ± 0.0005	"E" diameter inch ± 0.005
3/8	1/2	4	0.500	0.250	0.480
1/2	5/8	4-1/4	.750	.320	.680
5/8	7/8	4-1/2	1.000	.430	.680
3/4	1	4-1/2	1.000	.510	.880
1	1-1/8	4-1/2	1.000	.680	.980
1-1/2	1-3/8	5	1.500	1.000	1.000

[1] Distance across flats of hexagon bar.

Page 8

Figure 6: In the drawing, delete "Bolt" and substitute "Test specimen".

Page 9

4.6.2, last sentence: Delete "bolt".

Add the following paragraphs:

"4.8 Sound pressure level test. The sound pressure level test shall be conducted in accordance with the applicable provisions of ANSI S5.1, except as modified herein. The test fixture shall be equivalent to figure 18 of ANSI S5.1 and the acceptable limits shall be as specified in 3.10.1.

Page 9 (cont'd.)

4.8.1 Acoustical calibration. The entire instrumentation system shall be calibrated before each test series, allowing a minimum instrument warmup period of 5 minutes if transistorized and 1/2 hour if vacuum tube. Recalibration shall be performed if any instrument adjustment is necessary during progress of the test.

4.8.2 Background sound level. The ambient noise level shall be at least 10 dbA less than the measurement taken with the tool running in all tool and microphone orientations. In addition, the sound produced by the energy absorbing device used in the "on load" test must be at least 10 dbA below the machine's own sound output."

5.1: Delete and substitute:

"5.1 Preservation, packaging, packing, and marking. Impact wrenches shall be preserved, packaged, packed, and marked in accordance with PPP-P-40. The level of preservation, packacing, and packing shall be level A, B, or C as specified (see 6.1)."

5.2, 5.2.1 and 5.2.2: Delete in their entirety.

6.1(g): Delete.

Add the following new paragraph:

"6.2.2 Maximum sound pressure levels have been set to insure against occupational noise-induced hearing losses. The tools covered by this specification are considered intermittent duty tools, used in short bursts of two minutes duration or less, 0.5 "on-fraction". The exposure time for tool sizes up to and including 1/2 inch is four hours. The larger sizes are considered to be less intermittent, and have an exposure time of two hours."

Page 10

6.3: Delete and substitute:

"6.3 With respect to products requiring qualification, awards will be made only for products which are at the time set for opening of bids, qualified for inclusion in applicable Qualified Products List QPL OO-W-891, whether or not such products have actually been so listed by that date. The attention of the suppliers is called to this requirement, and manufacturers are urged to arrange to have the products that they propose to offer to the Federal Government tested for qualification in order that they may be eligible to be awarded contracts or orders for the products covered by this specification. The activity responsible for the Qualified Products List is the Naval Ship Engineering Center, Prince George's Center, Center Building, Hyattsville, Maryland 20782, and information pertaining to qualification of products may be obtained from that activity. Application for Qualification tests shall be made in accordance with "Provisions Governing Qualification SD-6" (see 6.3.1).

"6.3.1 Copies of "Provisions Governing Qualification SD-6" may be obtained upon application to Commanding Officer, Naval Publications and Forms Center, 5801 Tabor Avenue, Philadelphia, Pennsylvania 19120."

Under "Preparing activity": Delete "GSA-FSS" and substitute "NAVY - SH".

Preparing activity:
Navy - SH
(Project 5130-N209)

OO-W-891e
AMENDMENT -1
October 16, 1967

FEDERAL SPECIFICATION

WRENCH, IMPACT, PNEUMATIC, PORTABLE

This amendment, which forms part of Federal Specification OO-W-891e, dated August 25, 1967, was approved by the Commissioner, Federal Supply Service, General Services Administration, for the use of all Federal agencies.

Page 3, Table I, column 7: For Spindle size 1, delete "5" seconds and substitute "8" seconds.

Page 7, Table IV: Delete and substitute:

"TABLE IV. Dimensions of test specimens

Spindle size inches	Nominal[1/] hex, size A, inches	Overall length B, inches	"C" length, inches, ±0.005	"D" diameter, inch, ± 0.0005	"E" diameter, inch, ± 0.005
3/8	1/2	4	0.500	0.250	0.480
1/2	5/8	4-1/4	.750	.320	.680
5/8	7/8	4-1/2	1.000	.430	.680
3/4	1	4-1/2	1.000	.510	.880
1	1-1/8	4-1/2	1.000	.680	.980
1-1/2	1-3/8	5	1.500	1.000	1.000

[1/] Distance across flats of hexagon bar. "

Page 10, "Preparing activity:": Delete "GSA-FSS" and substitute "Navy - SH".

Custodians:
  Army - GL
  Navy - SH
  Air Force - 84
Review activities:
  Army - GL
  Navy - SH
  Air Force - 84

User activities:
  Navy - YD, MC

Civilian Agency Interest:
  GSA -FSS

Preparing activity:
  Navy - SH
  (Project 5130-0149)

FSC 5130

3.8 **Bearings.** All rotating parts of the wrenches shall be provided with commercially available bearings. The rotor shaft shall be provided with ball bearings. Needle and roller bearings, which are primarily designed for radial loads, shall not be used in a thrust position. If open type bearings are used, they shall be suitably housed and adequately sealed to prevent leakage of lubricant and entrance of dirt and dust. The drive end of the spindle may be supported by a suitable inserted sliding contact type bearing (sleeve bearing).

3.9 **General construction.** Wrenches shall be of rugged construction so as to withstand, without failure, treatment likely to be encountered under general service conditions. Wrenches shall be self-contained, readily accessible for adjustment or replacement of parts. Parts which require lubrication shall be properly enclosed so as to prevent entrance of foreign particles and leakage of lubricant. Working parts exposed to wear shall be of sufficient hardness to withstand the service required. Parts shall be properly finished by machining or grinding to dimensions within limits established by good commercial practice. Similar parts shall be interchangeable and of good fit when assembled with relative parts of the same size, type, and make. Wrenches shall be reliable and effective when operated on compressed air lines at gage pressures between 80 and 100 pounds per square inch (p.s.i.).

3.10 **Housing.** Housing shall be strong enough to prevent indentation under service conditions. When threaded fasteners are utilized to assemble adjacent housing components, through bolting shall be used in preference to tapped holes. Cap screws, if used, shall engage threads in ferrous housings or ferrous inserts in nonferrous housings by not less than a length equal to the pitch diameter of the fastener thread. Where ferrous inserts are not used in nonferrous housings, cap screws shall engage threads by not less than length equal to 1-1/2 times the pitch diameter of the fastener thread. All threaded fasteners shall be secured with suitable locking devices.

3.11 **Spindle.** The drive end of the spindle shall be wear-resistant. The drive end, when fitted with a socket, shall not show excessive run-out which may adversely affect operation of the wrench. The drive end of the spindle shall conform to USASI B5.38 for the nominal square male drive size, as specified for the applicable size wrench in table I.

3.12 **Operation.** The wrenches shall be reversible. The rotational direction of the wrench shall be controlled by a conveniently located mechanical device which is independent of the throttle. The rotational control shall be plainly and permanently marked to indicate direction of rotation.

3.13 **Impact unit.** Wrenches shall contain an impact unit which is actuated by the motor. The impact unit shall be designed to convert torque from the motor into rotary impacts and to transmit these impacts to the spindle.

3.14 **Sizes.** The wrenches shall conform to the requirements of table I for the size specified (see 6.1), and shall be similar to figures 1, 2, 3, 4, or 5, as applicable. The performance criteria of table I applies to the wrenches in the forward(counterclockwise rotation of the spindle looking at the front of the wrench) direction only:

TABLE I. Weight, dimensional and performance requirements

Spindle size	Weight max.	Length max.	Spindle offset max.	Air inlet (NPT-NPTF)	Air consumption[1] at load max.	Time to twist bolt specimen 180° max.
Inches	Pounds	Inches	Inches	Inch	CFM	Seconds
3/8	5	9-1/4	1-1/4	1/4	15	5
1/2	7	10-5/8	1-3/8	1/4	30	5
5/8	12	12	1-5/8	1/4	35	5
3/4	19	16	2	3/8	50	5
1	35	21-1/8	2-1/2	3/8	60	5
1-1/2	73	25-5/8	3	1/2	85	10

[1] Air consumption at load measured during test specimen twist test.

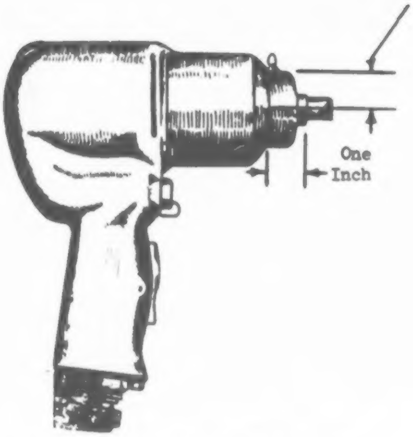

FIGURE 1. Pistol style handle.

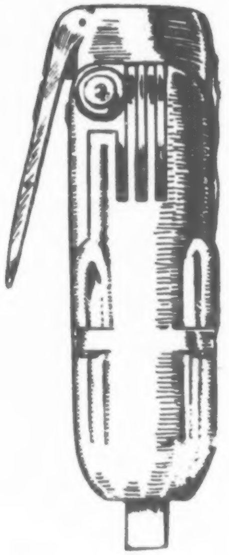

FIGURE 2. Body grip style handle.

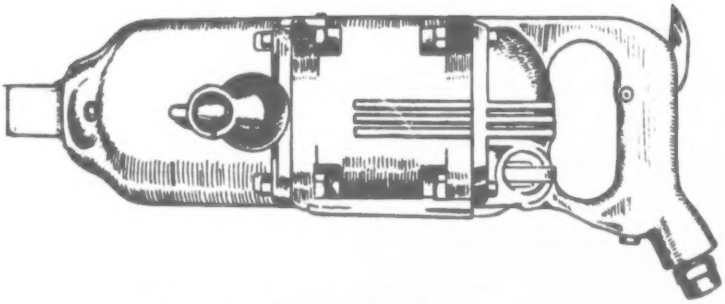

FIGURE 3. Closed style handle.

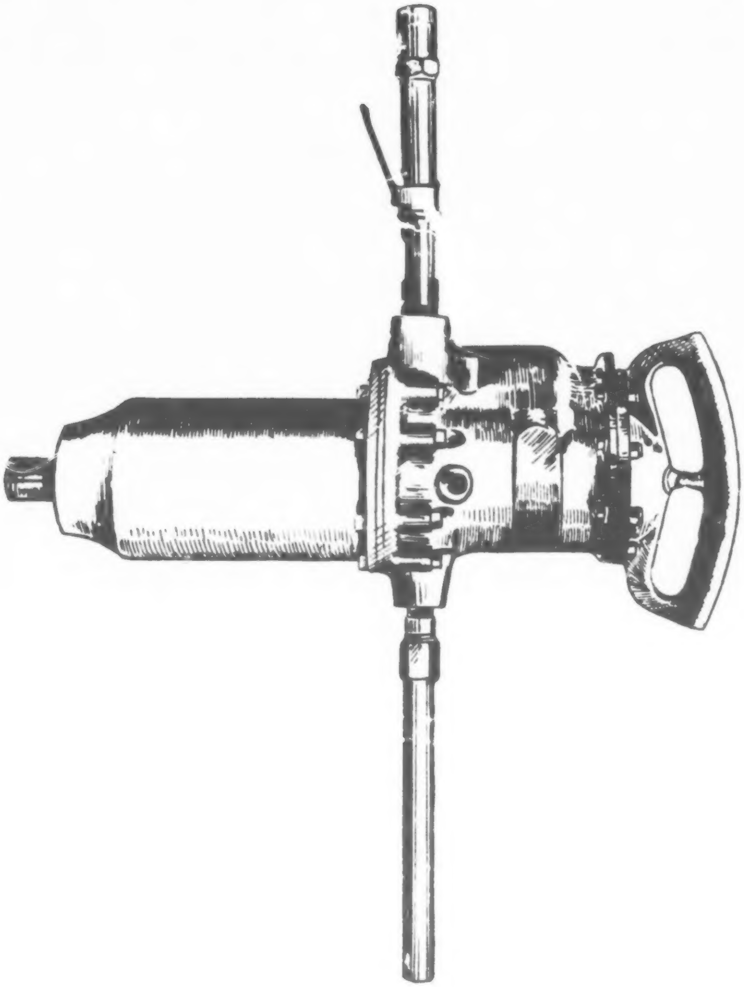

FIGURE 4. Fixed handle or grip.

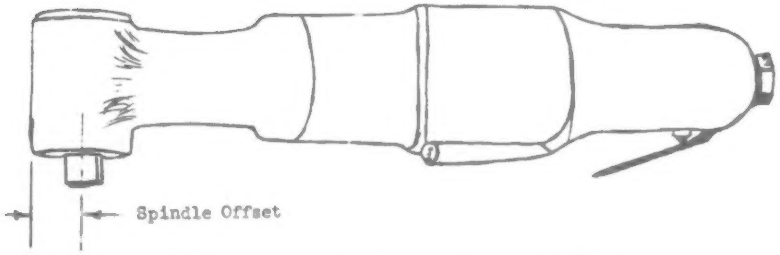
Spindle Offset

FIGURE 5. Body grip style handle, angle drive.

3.15 Angle drive. When specified (see 6.1), the 1/4 and 3/8 inch wrenches shall be of the angle drive type with the axis of the drive shaft 90° from the axis of the wrench housing.

3.16 Handles.

3.16.1 Sizes 3/8 and 1/2 inch. Each wrench of the 3/8 and 1/2 inch size shall be equipped with a pistol-style handle (fig. 1) or a body grip-style handle figure 2 or 5 (when applicable), as specified (see 6.1). The pistol-style handle tool shall be fitted with the air-inlet connection at the base of the handle. The body-grip style handle tool shall be fitted with the air-inlet connection at the end of the housing opposite the spindle.

3.16.2 Sizes 5/8 to 1 inch. Each wrench of the 5/8 to 1 inch size shall be equipped with a closed-style handle (fig. 3) located at the end of the housing opposite the spindle or a pistol-style handle (fig. 1), as specified (see 6.1). Sizes 5/8 to 1 inch wrenches shall be fitted with the air-inlet connection at the base of the handle. Wrenches furnished with closed-style handles shall be equipped with a removable "dead" handle located in or on the housing, perpendicular to the spindle axis and to the plane of the closed-style handle.

3.16.3 Size 1-1/2 inch. Each wrench of the 1-1/2 inch size shall be equipped with a fixed handle or grip (fig. 4) located at the end of the housing opposite the spindle, a removable "dead" handle located in the side of the housing perpendicular to the spindle axis, and a "live" handle in the side of the housing in alignment with the "dead" handle. The "live" handle shall be fitted with the air-inlet connection.

3.17 Throttle. Wrenches shall be provided with a nonleakable manual throttle for controlling the supply of compressed air. Throttles shall be of such design that the speed can be regulated during the operation. Wrenches of the 1/4 to 1 inch sizes shall be equipped with a trigger, button, or lever style throttle on the handle. Wrenches of the 1-1/2 inch size shall be equipped with a sleeve or lever style throttle on the "live" handle.

3.18 Accessories or extra equipment. When specified (see 6.1), accessories or extra equipment shall be furnished.

3.19 Air volume (torque) regulator. The wrenches shall be furnished with an air volume (torque) regulator. The regulator may either be built into the wrench or furnished separately. It shall have varying degrees of restriction for regulating the volume of air flow. When in the wide open position, the wrench air consumption shall not exceed that shown in table I.

3.20 Instruction book. One copy of an instruction book consisting of the manufacturer's standard commercial instructions and parts list, bound together, shall be furnished with each wrench.

3.21 Workmanship. The wrenches and accessories shall be free from all imperfections which will adversely affect the general appearance, function, or serviceability.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract or purchase order, the supplier is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified, the supplier may utilize his own facilities or any commercial laboratory acceptable to the Government. The Government reserves the right to perform any of the inspections set forth in the specification where such inspections are deemed necessary to assure that supplies and services conform to prescribed requirements.

4.1.1 Inspection of materials and components. In accordance with 4.1, the supplier is responsible for insuring that materials and components used were manufactured, tested, and inspected in accordance with the requirements of referenced subsidiary specifications and standards to the extent specified herein, or if none, in accordance with this specification.

4.2 Qualification tests. Qualification tests shall be conducted at a laboratory satisfactory to the Naval Ship Engineering Center and shall consist of the tests specified in 4.6 and 4.7, and the examination specified in 4.4. Tests shall be conducted on each size impact wrench for which qualification is desired. Application for qualification tests shall be made in accordance with "Provisions Governing Qualification" (see 6.3).

4.3 Quality conformance inspection.

4.3.1 Inspection lot. Wrenches of the same size shall be considered a lot for the purpose of quality conformance inspection. Inspection shall include the examination of 4.4, the test of 4.6, and the inspection for delivery of 4.5.

4.3.2 Sampling procedures. Sampling procedures shall be in accordance with MIL-STD-105. Data for sampling shall be as stated in table II.

TABLE II. Sampling data

Category	Sample unit	Inspection level	Acceptable quality level	AQL expressed in terms of	Reference
Visual examination	One wrench	II	1.5	Percent defective	4.4.1
Dimensional and weight examination	One wrench	II	1.5	Percent defective	4.4.2
Testing for quality conformance	One wrench	II	1.5	Percent defective	4.6
Preparation for delivery	One wrench packaged for delivery	II	4.0	Percent defective	4.5

4.4 Examination.

4.4.1 Visual examination. Each sample unit shall be examined for any nonconformance in design, material, finish, construction, workmanship, and marking. Defects are listed in table III.

TABLE III. Classification of defects

No.	Defects
1	Material nonconforming.
2	Wrench not easily adjustable or parts not easily replaceable.
3	Lubricated parts enclosure nonconforming.
4	Similar parts not dimensionally and functionally interchangeable.
5	Air-inlet connection not as specified, damaged, or missing.
6	Air strainer mission or damaged, not easily removable.
7	Marking, nonconforming, illegible, incorrect, or missing.
8	Handles not as specified or damaged, not removable, when required.
9	Throttle nonconforming, damaged, inoperable, or missing.
10	Spindle not as specified.
11	Bearings not as specified, broken, cracked, or pitted.
12	Lubrication of wrench not as specified; evidence of oil leakage.

4.4.2 Dimensional and weight examination. Each sample unit shall be examined for any nonconformance with dimensional and weight requirements.

4.5 Inspection of preparation for delivery. The preservation, packaging, packing, and marking shall be examined for conformance with the requirements of section 5.

4.6 Test specimen twist test. Sample wrenches shall be subjected to a test to determine compliance with the twist time requirements specified in table I, for the applicable size wrench being tested.

4.6.1 Apparatus. The test set-up shall consist of a fixture for holding the test specimen, similar to that shown in figure 6. The specimen shall be machined from annealed, unfinished hexagon bar stock, conforming to SAE grade 1 commercial steel, having a minimum tensile strength of 55,000 p.s.i., containing not more than 0.05 percent phosphorus and 0.06 percent sulphur, with a maximum hardness of 95 on the Rockwell B scale. The specimen shall be of the shape shown in figure 7 and the dimensions specified in table IV for the size wrench being tested.

TABLE IV. Dimensions of test specimens

Size of wrench, inches	Nominal[1] hex, size A, inches	Overall length B, inches	"C" length, inches, ±0.005	"D" diameter, inch, ± 0.0005	"E" diameter, inch, ± 0.005
1/4	1/2	4	0.500	0.250	0.480
3/8	5/8	4-1/4	.750	.320	.680
5/8	7/8	4-1/2	1.000	.430	.680
3/4	1	4-1/2	1.000	.510	.880
1-1/4	1-1/8	4-1/2	1.000	.680	.980
1-3/4	1-3/8	5	1.500	1.000	1.000

[1] Distance across flats of hexagon bar.

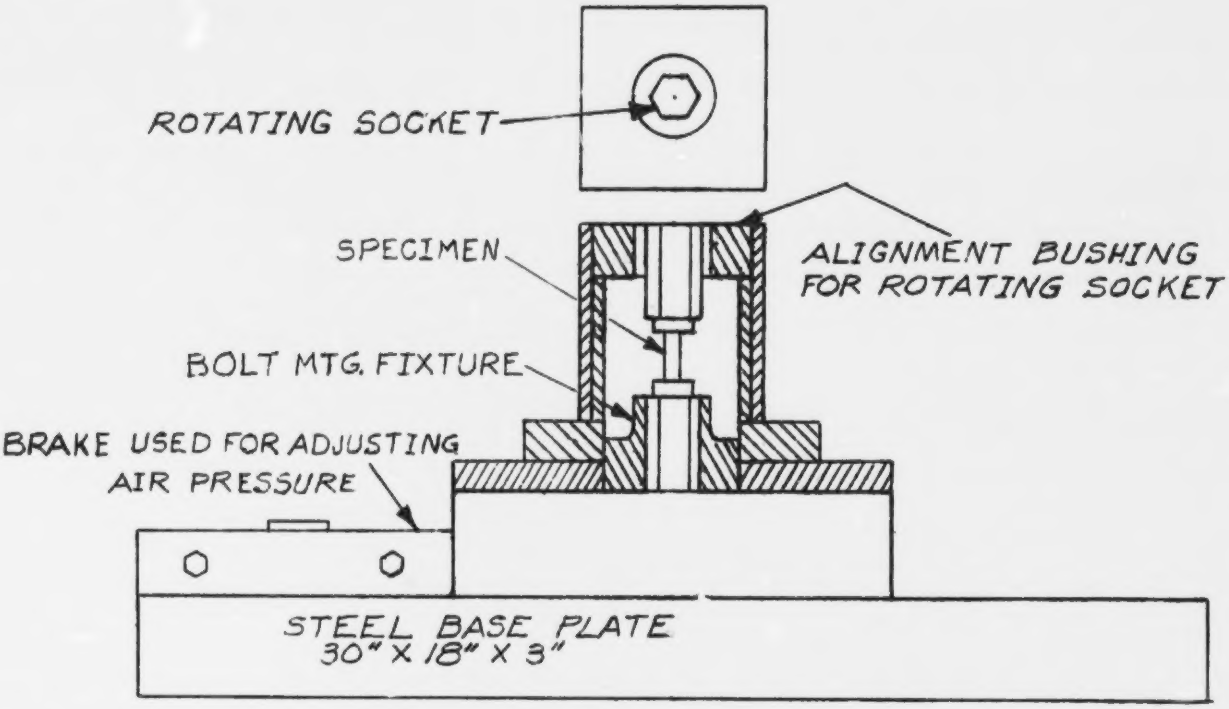
ROTATING SOCKET
SPECIMEN
ALIGNMENT BUSHING FOR ROTATING SOCKET
BOLT MTG. FIXTURE
BRAKE USED FOR ADJUSTING AIR PRESSURE
STEEL BASE PLATE 30" X 18" X 3"

FIGURE 6. Cross sectional drawing of "Time to Twist" set-up for pneumatic wrenches.

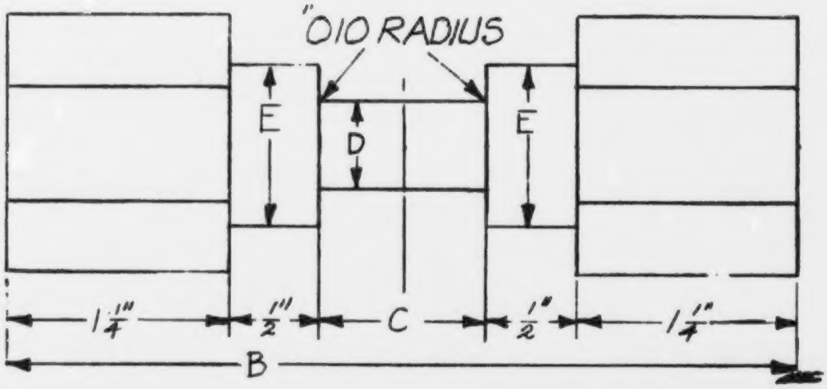
.010 RADIUS
E
D
E
1 1/4"
1/2"
C
1/2"
1 1/4"
B

FIGURE 7. Hexagon bar twist test specimen.

4.6.2 Procedure. A test specimen of the applicable size shall be mounted in the test fixture. The air supply to the wrench shall be adjusted by a means of a pressure regulator to a constant air pressure of 90 p.s.i. while the tang is rotating at approximately 15 revolutions per minute. The wrench shall then be mounted on the test specimen, using a socket of the same hexagon size as the hexagon size of the test specimen. The wrench shall be allowed to impact until the specimen twists 90°. Using this initial 90° twist as a datum point, the wrench shall again be allowed to impact for the time specified for the applicable size wrench being tested (see table I), and the test specimen shall have twisted an additional 180°. The time required to twist the specimen and the air consumption, while impacting, shall be recorded. Three runs shall be made with each size wrench being tested and the average values obtained for air consumption and time to twist the bolt specimen. Average values exceeding those specified in table I shall be cause for rejection. If a bolt specimen breaks prior to being twisted 180°, it shall be discarded and a new specimen substituted.

4.7 Service test (qualification testing only). Each size wrench submitted for qualification testing (see 4.2) shall complete 150 hours of actual work under practical service conditions. Each shall first be inspected in accordance with 4.4 and shall be tested in accordance with 4.6. The wrench shall then be put into field use to determine the ease of operation, general serviceability, suitability, and durability of the tool. Failure during the service test of any components of the tool, exclusive of attachments, shall be cause for rejection. After the service test has been completed, the wrench shall be completely disassembled and all parts examined. Any part broken, cracked, or deformed, or not in accordance with the requirements of this specification, shall be cause for rejection. Wrenches completing the service test and disassembly examination shall be reassembled and once again subjected to the test of 4.6.

5. PREPARATION FOR DELIVERY

5.1 Preservation, packaging, and packing. Impact wrenches shall be preserved and packaged in accordance with MIL-P-12829A, level A or C, as specified (see 6.1). Packing shall be in accordance with MIL-P-12829A, level A, B, or C, as specified (see 6.1).

5.2 Marking.

5.2.1 Civil agencies. In addition to any special marking required by the contract or order (see 6.1), interior packages and shipping containers shall be marked in accordance with Fed. Std. No. 123.

5.2.2 Military agencies. In addition to any special marking required by the contract or order (see 6.1), interior packages and shipping containers shall be marked in accordance with MIL-STD-129.

6. NOTES

6.1 Ordering data. Purchasers should select the preferred options offered herein and include the following data in procurement documents:

(a) Title, number, and date of this specification.
(b) Size required (see 1.2.1 and 3.14, table I).
(c) Whether wrenches of the 3/8- and 1/2-inch size shall be of the angle drive type (see 3.15).
(d) Handle style required, as applicable (see 3.16).
(e) Accessories or extra equipment, when required (see 3.18).
(f) Applicable preservation, packaging, and packing requirements (see 5.1).
(g) Special marking, if required (see 5.2).

6.2 Definitions.

6.2.1 Spindle offset. The spindle offset, specified in table I, is defined as the distance from the center line of the spindle to the edge of the wrench housing, measured one inch from the base of the spindle on the housing (for example see fig. 1). For the angle drive type, see figure 5.

6.3 With respect to products requiring qualification, awards will be made only for such products as have, prior to the time set for opening of bids, been tested and approved for inclusion on Qualified Products List (QPL) OO-W-891, whether or not such products have actually been so listed by that date. The attention of the suppliers is called to this requirement, and manufacturers are urged to arrange to have the products that they propose to offer to the Federal Government tested for qualification, in order that they may be eligible to be awarded contracts or orders for the products covered by this specification. The activity responsible for the qualified products list is the Naval Ship Engineering Center, Washington, D. C., 20360, and information pertaining to qualification of products may be obtained from that activity. Application for qualification tests shall be made in accordance with Provisions Governing Qualification. (Copies may be obtained from the Commanding Officer, Naval Supply Depot, 5801 Tabor Ave., Philadelphia, Pa., 19120.)

MILITARY CUSTODIANS:
Army - GL
Navy - Sh
Air Force - 69

Preparing activity:
GSA-FSS

Review activities:
Army - GL
Navy - Sh
Air Force - 69

User activities:
Navy - MC, YD

☆U. S. Government Printing Office: 1967 O - 302-503 (274)

Orders for this publication are to be placed with General Services Administration, acting as an agent for the Superintendent of Documents. See section 2 of this specification to obtain extra copies and other documents referenced herein. Price of this specification 10 cents each.

387

DEPARTMENT OF THE INTERIOR

1884

March 3, 1849

United States Department of the Interior

OFFICE OF THE SECRETARY
WASHINGTON, D.C. 20240

Dr. Alvin Meyer, Director
Office of Noise Abatement and Control
Environmental Protection Agency
1750 K Street, N.W.
Washington, D.C. 20460

Dear Dr. Meyer:

Attached is the information you requested on Federal noise programs as they relate to the Department of Interior.

You will note that at this time, the Departments' noise activities are extremely limited, with only one program, specifically budgeted for noise abatement and control. One should not overlook the fact, however, that our interests are a good deal broader and that interference by noise in recreation, wildlife protection etc. are to some extent subsumed in other on-going program activities. We are also participating in an FAA sponsored study on the frequency and nature of sonic booms occurring over our western National Parks. The Bureau of Mines is also in the process of formulating a fairly extensive future program relating to the study of noise control in mines. Details of this program are still being reviewed internally.

Please let me know if any further information would be useful to you.

Sincerely yours,

Martin Prochnik

Martin Prochnik
Deputy Science Adviser

Enclosure

Department of Interior Noise Programs

I. ORGANIZATIONAL

CFR Title 41-Chapter 14, CFR Title 50-Chapter 4, CFR Title 36-Chapter 1, CFR Title 30-Chapter 1, CFR Title 43-Chapter II, Act of May 28, 1936 (16 USC 460, Federal Coal Mine Health and Safety Act of 1969 (Subpart F of Part 70, Subchapter O, Chapter I, Title 30 CFR.)

II. FUNCTIONAL

B. Specific Programs and Research

1. The Department is assisting an FAA funded project which is monitoring the frequency and characteristics of sonic booms over certain of our western National Parks. No funds are assigned directly to this support function. Results of this monitoring assist in achieving park management objectives such as protection of wildlife, geologic and archeologic features and protecting the recreational use of the parks.

2. The Bureau of Mines has instituted a training program for Inspectors who will survey noise conditions in mines. This monitoring is being done to assure compliance with noise standards for underground mines that were set by the Department of Health, Education and Welfare. As of August 13, 1971 approximately 1150 persons have been qualified to conduct noise measuring surveys.

3. The Bureau of Mines is also in the process of initiating a research program related to the noise problem and related hearing loss by miners. This would involve the assessment of presently used machinery and the design and evaluation of modified equipment that would reduce noise output and consequent hearing damage. Specific research items include the design of noise dosimeters, the identification of noise sources in underground mines and the screening of noise frequencies in order to improve communication.

C. PROCEDURES

Problem areas are usually first identified in the field by personnel in a positions to directly observe negative effects. Corrective action and associated research would normally be handled at an Agency level if significant funds or policy decisions are involved. Specific actions to abate and control noise include the training program described above, and research on noise dosimeters, noise sources and communication being undertaken at the Bureau of Mines Laboratory in Pittsburgh.

Coordination with other Federal agencies is mostly through inter-agency committees dealing with noise and informal working relationships between groups and individuals of different agencies concerned with noise.

In-house capability is essentially limited to the mine inspector corps now in the process of being trained and a small group of Bureau of Mines Specialists headed by John N. Murphy of the Pittsburgh Mines and Safety Office of the Bureau. The Office of the Science Adviser has picked up a certain amount of familiarity with noise problems in acting as the central coordination point on noise matters for the Department of Interior.

D. A working draft has been prepared on a new program dealing with all perspectives of the coal mine noise problem. This program is now under internal review and cannot therefore be fully described at this time. It involves an evaluation of the current noise situation in mines, measuring noise and the design of new equipment that would ameliorate noise problems.

III. FISCAL

A. Current Programs

The training program for coal mine noise inspectors did not require incremental outlays in facilities or equipment. Its cost is subsumed under other activities of the Coal Mine Health and Safety Program. The sonic boom monitoring program for the western parks is funded by the FAA. Supporting costs for Interior are included under other operating programs of the National Park Service.

Future Interior program plans in the noise field are almost entirely limited to the coal mine noise study noted above.

Facilities costs and personnel costs for the on going noise programs of the Bureau of Mines (other than the training program) are estimated at $45,000 for the in-house research described above and $19,000 for an acoustical research inventory contracted to Hydrospace Research Corp. F. Y. 1972 work has tentatively been slated to include a continuation of the ongoing research at Pittsburgh ($144,000) and a $70,000 project at the Rolla, Missouri Laboratory of the Bureau of Mines on the development of noise abatement material.

An unspecified amount of research support is slated for other noise research identified by the Bureau as having high priority. As noted above, this overall F.Y. 1972 program is still under internal review.

NATIONAL SCIENCE FOUNDATION

NATIONAL SCIENCE FOUNDATION
WASHINGTON, D.C. 20550

September 1, 1971

Dr. Alvin F. Meyer, Jr.
Director
Office of Noise Abatement and Control
Environmental Protection Agency
Washington, D.C. 20460

Dear Dr. Meyer:

In response to your letter of July 30, 1971, please find enclosed the National Science Foundation's contribution to a report to Congress on noise in accordance with Title IV of the Clean Air Act of 1970. In general, this material follows the outline enclosed with your July 30 letter.

If you or your staff have any questions concerning this information, I should be glad to try to answer them or to put you in touch with knowledgeable members of the Foundation's staff.

Sincerely yours,

G. R. Toney
Special Assistant
National and International Programs

Enclosure

NATIONAL SCIENCE FOUNDATION
August 30, 1971

FEDERAL NOISE PROGRAMS INFORMATION

I. Organizational

A. National Science Foundation

B. The Foundation is authorized by its enabling act, the National Science Foundation Act of 1950 (as amended), "to initiate and support scientific research, including applied research," among other functions. There is no legislative requirement or authority for the Foundation to engage specifically in research on noise, its effects and control, and acoustics.

II. Functional

A. Overall objectives are to support meritorious proposals for research on noise effects, noise control, and acoustics.

B. Six research projects funded in FY 1970 and four funded in FY 1971, all for 24 months, are still ongoing.

1. Description: See attachments.

2. Objectives

a. The program objectives are met by the principal investigators' carrying out their research on the problems proposed for investigation.

b. The program is evaluated by assessing the results of each research project as they appear in publications and reports in the professional literature and at scientific meetings. The criteria used in this evaluation are those normally applied: the validity of results with respect to the problems investigated, the adherence to the research plan, the contribution to the body of knowledge in the field, and the usefulness of the results toward furthering subsequent efforts.

C. Procedures

1. Several areas appear to the Foundation to merit consideration as priorities for support, owing to a) the lack of fundamental knowledge of auditory processes, b) the neglect of certain noise problems in recent reviews and reports, c) the recognized need for updating information, and d) the developing sense of urgency for progress in the solution of noise problems.

a. Anatomical and behavioral studies of the auditory systems of human beings, other primates, and some lower forms of animal life, including 1) the structures of the lower auditory system and the auditory behavior which may depend upon these structures, 2) the role of signal transients, and 3) the spectral cues in the localization of sounds.

b. Noise effects on, and protection of, "blue-collar" workers in factories, transportation systems, and boiler/utility rooms of buildings.

c. Noise reduction in industrial equipment and machinery through design and the setting of standards.

d. Reduction of noise through design of equipment for homes, apartments, and dormitories.

e. Involving industry in the above and other problem areas which would benefit from an industrial engineering approach.

f. Support of conferences of selected participants (including those from Congress) for stimulation of action in specific areas of noise abatement susceptible to engineering solutions.

2. The Foundation has taken no specific actions to abate or control noise.

3. Coordination of Foundation programs with similar or related efforts by other agencies is customarily carried on through both formal mechanisms and informal communication. In noise research, for example, membership on the Noise and Radiation Panel of the FCST *Ad Hoc* Committee on Environmental Quality, R. & D., establishes a formal contact with the other Federal programs.

4. The Foundation performs no in-house research. Its capability consists of scientists serving on the staff as directors of programs supporting scientific research and education in the sciences. Consultants acting as proposal reviewers and as members of advisory committees and panels may have scientific, engineering or industrial experience in noise programs.

5. There are no specific plans for upgrading noise programs in the Foundation. However, increased awareness of the role played by noise in daily life is expected to result in a greater number of worthwhile proposals for noise-related research.

D. For the near future the Foundation will continue to support unsolicited meritorious proposals and will encourage the submission of proproals from academic and other groups engaged in research on noise problems and acoustics.

III. Fiscal

A. Current Program

1. The total real property value of facilities and equipment used for Foundation-supported noise research cannot be determined. The Foundation funded equipment purchases for noise research amounting to $99,200 in fiscal years 1968 through 1971.

2. The Foundation has no specific allocation of FY 1972 funds for noise research. Support of proposals in all fields of science is generally decided on the basis of merit, as determined by outside reviews and staff evaluations.

3. Personnel

a. The Special Engineering Program director and secretary spend approximately 15 percent of their working time on the program subdiscipline, Acoustics and Noise Control. In the Psychobiology and the Neurobiology Programs, two program officers and a secretary devote about 12.5 percent of their effort to audition proposals.

b. Proportional salaries for noise program management in the three program areas amounts to about $15,000 annually.

4. Contracts, grants, loans, and subsidies

a. Six current projects funded in FY 1970 for 24 months are 80 to 90 percent completed. Four research projects funded for 24 months late in FY 1971 are 10 to 15 percent completed.

b. Funding by project: See attachment.

c. Total research expenditures for ongoing projects

FY 1970	$197,000
FY 1971	175,000
Total	$372,000

B. Past and Future Programs

1. Past programs

a. For FY 1969 through FY 1971, the total of 23 grants for noise-related research amounted to $641,000.

b. In the fiscal years 1968 through 1971 the Foundation awarded a total of $99,200 in grants for equipment acquisitions for research on noise and acoustics.

2. No projections for future noise research have been made. However, dependent upon the number and quality of proposals and available funds, it is expected that obligations for research on noise problems and acoustics and for facilities acquisitions will increase.

IV. The Foundation has no authority or responsibility for regulation or certification of activities in the field of noise pollution.

Attachments: 11

III. A.4.b. Funding of ongoing projects

Title	Institution	Prinicipal Investigator	FY	Duration (mos.)	Amount
Behavioral and Anatomical Investigation of the Auditory System in Mammals	Boston U.	J.M. Harrison	70	24	$40,000
Acoustic Transients: A Study of Waveform Parameters	U. of Chicago	S. Zerlin	70	24	34,700
Sound Reinforcement by Structural Interaction	M.I.T.	S.H. Crandall	70	24	38,500
The Performance of Acoustic Filters	U. of Mo.-Rolla	W.S. Gatley	70	24	26,000
Electrical Stimulation of Subcortical Auditory Centers	U. of Pitt.	F.B. Colavita	70	24	27,500
Studies of Auditory Signal Processing	Purdue U.	R.D. Sorkin	70	24	30,300
Auditory Perception of Temporal Order	Cornell U.	U. Neisser, G.W. Wilcox	71	24	54,900
Detection of Masked Binaural Signals	U. of Ga.	W.A. Wilbanks	71	24	30,000
Physiological and Behavioral Studies of Sound Reception	U. of Ill.-Urbana	M. Salmon	71	24	40,000
Central Auditory Mechanisms	Stanford U.	J.H. Dewson III	71	24	50,100
TOTAL					$372,000

Attachment

NATIONAL SCIENCE FOUNDATION

PROJECT SUMMARY

NAME OF INSTITUTION *(NSF Directory Name)* Boston University	ADDRESS OF INSTITUTION *(Include branch/campus & component)* Boston, Massachusetts 02215
PRINCIPAL INVESTIGATOR HARRISON, J. M.	SOCIAL SECURITY NO.
	DIVISION (OFFICE) Biological and Medical Sciences
	SECTION
PROPOSAL NUMBER B020103	PROGRAM Psychobiology

TITLE OF PROJECT

Behavioral and Anatomical Investigation of
the Auditory System in Mammals

SUMMARY OF PROPOSED WORK *(limit to 22 pica or 18 elite typewritten lines)*

This research project is a two year renewal of GB-7617. The work of this laboratory is concerned with the systematic exploration of the structure of the lower auditory system and with the investigation of auditory behavior which may depend upon these structures. According to the program outlined, the PI plans to continue work in both the anatomical and behavioral areas. The goal of the anatomical work is threefold. It includes: (1) Description of cochlear nucleus and superior olivary complex in primates. The PI will investigate the cochlear nucleus and superior olivary complex in one (or more) species of large primate and to relate this to the auditory system in man. (2) Comparative variation of the superior olivary complex in primates. The PI plans to follow up the comparative work on the superior olivary complex, particularly in primates, as it is profitable to study auditory structures in primates as a guide to understanding the system in man. (3) Analysis of cellular organization of rat cochlear nucleus. It is planned to continue the study of Golgi stained rat material (about 100 brainstems) prepared by Fedlman ('69). The behavioral study includes: (a) comparative behavioral study of localization and (b) acquisition of the discrimination of location by man.

NSF Form 4, March 1968

FY-70

$40,000
24 mos.

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NATIONAL SCIENCE FOUNDATION

PROJECT
SUMMARY

NAME OF INSTITUTION *(NSF Directory Name)* University of Chicago	ADDRESS OF INSTITUTION *(Include branch/campus & component)* Chicago, Illinois 60637
PRINCIPAL INVESTIGATOR ZERLIN, Stanley SOCIAL SECURITY NO.	DIVISION (OFFICE) Biological and Medical Sciences SECTION
PROPOSAL NUMBER B015154	PROGRAM Psychobiology

TITLE OF PROJECT

Acoustic Transients: A Study of Waveform Parameters

SUMMARY OF PROPOSED WORK *(limit to 22 pica or 18 elite typewritten lines)*

Transient signals have been used extensively in studies of binaural interaction. One of the reasons for the general lack of coherence in this area is our inability to describe the effects of transients on the cochlea and on the neural patterns resulting from transient stimulation.

It is not clear whether the cochlea performs predominantly a time (waveform) analysis or a Fourier (frequency) analysis on transient signals. Cochlear models suggest the former, while most psychoacoustic work has assumed the latter. It is this investigator's contention that cochlear processing of transients more closely approaches a waveform analysis.

The main emphasis of this psychoacoustic research is to clarify the relation between (1) acoustic transients and their displacement patterns on the basilar membrane (2) these displacement patterns and the resultant neural activity. These dependencies will be investigated through the interaction of timing signals arising from the two ears. Improved understanding of the parameters underlying transient stimulation will then allow study of the relations between transient and sinusoidal excitation. Clarification of both areas is an essential step in determining the extent to which the cochlea acts as either a spectrum or a waveform analyzer.

NSF Form 4, March 1968

FY-70

$34,700
24 mos.

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NATIONAL SCIENCE FOUNDATION

PROJECT SUMMARY

NAME OF INSTITUTION *(NSF Directory Name)* Massachusetts Institute of Technology	**ADDRESS OF INSTITUTION** *(include branch/campus & component)* School of Engineering Cambridge, Massachusetts
PRINCIPAL INVESTIGATOR Crandall, Stephen H.	**SOCIAL SECURITY NO.**
	DIVISION (OFFICE) Engineering
	SECTION
PROPOSAL NUMBER K010160	**PROGRAM** Special Engineering

TITLE OF PROJECT

Sound Reinforcement by Structural Interaction

SUMMARY OF PROPOSED WORK *(limit to 22 pica or 18 elite typewritten lines)*

The acoustical design of concert halls and auditoriums is only imperfectly undertood, and designs are still based to a considerable extent on tradition and experience. The factors influencing the excitation of a concert hall by individual instruments are even less well known, and the important problem of "bass weakness", a lack of excitation by cellos and stringed basses, has hardly been investigated. With the help of a grant from the National Science Foundation Dr. Stephen Crandall at the Massachusetts Institute of Technology will undertake a study of this problem. He will look specifically at the mechanism of energy transmission from the end pin of the instrument to the stage floor and the following reradiation from the floor to the walls and to the air in the hall, with the hope of being able to enhance the energy transfer. The study will involve both analytical aspects and experimental work with actual musical instruments, the latter in both laboratory and concert hall settings.

$ 38.5 K / 24 mos. FY 70 IV, D

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7/23/69

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NATIONAL SCIENCE FOUNDATION

PROJECT SUMMARY

NAME OF INSTITUTION (NSF Directory Name) University of Missouri-Rolla

ADDRESS OF INSTITUTION (Include branch/campus & component) Rolla, Missouri

PRINCIPAL INVESTIGATOR Gatley, William S.

SOCIAL SECURITY NO.

DIVISION (OFFICE) Engineering

SECTION

PROPOSAL NUMBER K010844

PROGRAM Special Engineering

TITLE OF PROJECT

The Performance of Acoustic Filters

SUMMARY OF PROPOSED WORK (limit to 22 pica or 18 elite typewritten lines)

The proposed research program will complement and extend work now being completed under NSF Research Initiation Grant GK-1481. The objectives of this project are to evaluate basic acoustic filter elements using elementary theory and specially-designed equipment, and to investigate the influence of size, temperature, steady flow and intense sound levels on the performance of acoustic filters. The proposed research will, in part, complete this investigation for certain classes of silencers, with the ultimate goal of developing a systematic procedure that is applicable to a wide variety of noise control problems. Such a procedure, if available, would greatly reduce the trial-and-error testing of prototypes and make possible the incorporation of effective noise control into the initial design of new products.

$26,000/24 mos. FY 70 I, D

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9-11-69

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NATIONAL SCIENCE FOUNDATION

PROJECT SUMMARY

NAME OF INSTITUTION (NSF Directory Name): University of Pittsburgh

ADDRESS OF INSTITUTION (Include branch/campus & component): Pittsburgh, Pennsylvania 15213

PRINCIPAL INVESTIGATOR: COLAVITA, Francis B.

SOCIAL SECURITY NO.:

DIVISION (OFFICE): Biological and Medical Sciences

SECTION:

PROPOSAL NUMBER: B017418

PROGRAM: Psychobiology

TITLE OF PROJECT: Electrical Stimulation of Subcortical Auditory Centers

SUMMARY OF PROPOSED WORK (limit to 22 pica or 18 elite typewritten lines)

It is generally recognized from work on human patients that sensory experiences produced by cortical stimulation are crude and unnatural, perhaps because of the difficulty involved in entering the nervous system at its level of greatest organizational complexity. A number of recent animal experiments suggest that subcortical brain stimulation shows promise as a technique for producing sensory experiences and controlling their qualities, presumably because the artifical nature of the stimulus is progressively reduced as the neural impulses are transmitted upward through the CNS to the cortex.

Previous experimental work in this laboratory suggests that electrical stimulation of subcortical brain regions, when combined with behavioral training and testing of experimental animals, can provide a means of studying coding and transmission of sensory information by the CNS. The present program will continue and extend this line of investigation.

CNS - Central Nervous System

NSF Form 4, March 1968

FY-70

$ 27,500

24 mos.

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NATIONAL SCIENCE FOUNDATION

PROJECT SUMMARY

NAME OF INSTITUTION *(NSF Directory Name)* Purdue University	**ADDRESS OF INSTITUTION** *(Include branch/campus & component)* Lafayette, Indiana 47907
PRINCIPAL INVESTIGATOR / **SOCIAL SECURITY NO.** SORKIN, Robert D.	**DIVISION (OFFICE)** Biological and Medical Sciences **SECTION**
PROPOSAL NUMBER B014039	**PROGRAM** Psychobiology

TITLE OF PROJECT

Studies of Auditory Signal Processing

SUMMARY OF PROPOSED WORK *(limit to 22 pica or 18 elite typewritten lines)*

This project consists of a two-phased investigation of some fundamental aspects of the hearing mechanism, the two phases of the research to proceed concurrently. Phase one consists of monaural investigations of the adaptive character of auditory behavior in signal detection situations. Phase two consists of a program of binaural experimentation on the phenomenon of two-channel detection, as embodied in contralateral cueing and simultaneous detection situations. This phase of the study represents an empirical extension of the traditional Masking Level Difference (MLD) data and an attempt to evaluate a class of interaural cross-correlation models as appropriate descriptions of behavior in contralateral cueing and simultaneous detection situations.

NSF Form 4, March 1968

FY 70

$ 30,300
24 mos.

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NATIONAL SCIENCE FOUNDATION

PROJECT SUMMARY

NAME OF INSTITUTION (NSF DIRECTORY NAME) Cornell University	ADDRESS OF INSTITUTION (INCLUDE BRANCH/CAMPUS & COMPONENT) Ithaca, New York 14850
PRINCIPAL INVESTIGATOR / SOCIAL SECURITY NO. NEISSER, Ulric 579 30 7292 WILCOX, Gordon W. 385 32 9750	DIVISION (OFFICE) AND DIRECTORATE Biological and Medical Sciences SECTION
PROPOSAL NUMBER P1B1283	PROGRAM Psychobiology

TITLE OF PROJECT

Auditory Perception of Temporal Order

SUMMARY OF PROPOSED WORK (LIMIT TO 22 PICA OR 18 ELITE TYPEWRITTEN LINES)

It has recently been reported that listeners cannot determine the order in which four cyclically-presented noises are occurring, if each one lasts only 200 msec. The Investigators have discovered, however, that subjects can easily tell whether the orders of two such sequences are the same or different. To elucidate this discrepancy, a systematic study of temporal-order perception will be made, both as a function of method of presentation and of stimulus duration.

Two theoretical approaches will guide this research. First, a model has been developed with the above observations which is consistent with the general approach of signal detection theory. This leads to specific predictions about the relative difficulty of various sequences. Second, since the view that cognitive processes are "constructive" is particularly applicable to the perception of temporal order, an attempt will be made to study perceptual learning as it occurs in these tasks, and also to examine the short term or "echoic" memory involved in comparing two sequences.

GB-28712
$54,900
2 years

FY 71

INSTRUCTIONS FOR USE

1. Program Office will complete all items appearing on the first copy; place Proposal Folder copy in the folder; retain Program Suspense copy; and place other copies inside the folder envelope with carbons intact.
2. Grants and Contracts Office will post grant number, amount granted and inclusive project dates on the S.I.E. copy and make distribution of remaining copies.

NSF Form 4, Jan. 1970

1. PROPOSAL FOLDER

NATIONAL SCIENCE FOUNDATION

PROJECT SUMMARY

NAME OF INSTITUTION *(NSF Directory Name)*
University of Georgia

ADDRESS OF INSTITUTION *(include branch/campus & component)*
Athens, Georgia 30601

PRINCIPAL INVESTIGATOR
WILBANKS, William A.

SOCIAL SECURITY NO.

DIVISION (OFFICE)
Biological and Medical Sciences

SECTION

PROPOSAL NUMBER
B023936

PROGRAM
Psychobiology

TITLE OF PROJECT
Detection of Masked Binaural Signals

SUMMARY OF PROPOSED WORK *(limit to 22 pica or 18 elite typewritten lines)*

The research described in this proposal represents a two-year renewal of research on binaural hearing initiated under NSF Grant GB-8290. The PI is specifically concerned with the problem of how the binaural system detects weak signals in the presence of noise. The research which he plans is based upon the view that an appropriate model of the binaural system is a cross-correlation mechanism that achieves an improved signal-to-noise ratio over that required for monaural detection by detecting the change in the cross-correlation of the noise when the signal is added. This improvement in detection that occurs when listening is done binaurally has come to be called the masking-level difference or MLD. The specific aims of the research are: (1) to determine by means of parametric experiments the functional relationship between the detection performance of human observers and the change in the cross-correlation of the stimulus events to which the observer is responding: (2) to determine by means of parametric experiments the relationship between the human observer's use of a rating-scale in detection experiments and the stimulus for binaural detection: and (3) to continue the research initiated under NSF Grant GB-8290 on the frequency limits of binaural signal detection as a function of noise level.

GB-23936
$30,000 / 2 years

NSF Form 4, March 1968
FY 71

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1. PROPOSAL FOLDER COPY

NATIONAL SCIENCE FOUNDATION

PROJECT SUMMARY

NAME OF INSTITUTION *(NSF Directory Name)* University of Illinois at Urbana		ADDRESS OF INSTITUTION *(Include branch/campus & component)* Urbana, Illinois 61801
PRINCIPAL INVESTIGATOR SALMON, Michael	SOCIAL SECURITY NO.	DIVISION (OFFICE) Biological and Medical Sciences
		SECTION
PROPOSAL NUMBER B020766		PROGRAM Psychobiology

TITLE OF PROJECT

Physiological and Behavioral Studies of Sound Reception

SUMMARY OF PROPOSED WORK *(limit to 22 pica or 18 elite typewritten lines)*

On this research project, electrophysiological and behavioral experiments will examine the acoustical signaling system of fiddler crabs. From pilot experiments it has been shown that fiddler crabs possess a communicatory system based upon vibrational stimuli that is analogous to many vertebrate and insect "calling" systems in which air- or water-borne sound is utilized.

The specific objectives of this project are:

1. To define the sensitivity of selected species of fiddler crabs to pure tonal vibrations under laboratory conditions, and to natural sounds under field conditions;
2. To determine the nature of the behavioral response by females to acoustic stimuli provided by conspecific males during the reproductive period;
3. To establish the sensory basis for sound localization of males by females; and
4. To identify the physical and temporal properties of the courtship signals to which the males and females respond.

GB-20766
$40,000/2 years

NSF Form 4, March 1968
FY 71

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2. Grants Office will post grant number, amount granted and inclusive project dates on the S.I.E. copy and make distribution of remaining copies.

1. PROPOSAL FOLDER COPY

NATIONAL SCIENCE FOUNDATION

PROJECT SUMMARY

NAME OF INSTITUTION (NSF DIRECTORY NAME) Stanford University	ADDRESS OF INSTITUTION (INCLUDE BRANCH/CAMPUS & COMPONENT) Stanford, California 94305
PRINCIPAL INVESTIGATOR SOCIAL SECURITY NO. DEWSON, James H. III	DIVISION (OFFICE) AND DIRECTORATE Biological and Medical Sciences SECTION
PROPOSAL NUMBER B025869	PROGRAM Psychobiology
TITLE OF PROJECT Central Auditory Mechanisms	

SUMMARY OF PROPOSED WORK (LIMIT TO 22 PICA OR 18 ELITE TYPEWRITTEN LINES)

In this project, continuous performance functions will be derived for the auditory sequence discrimination abilities of normal and unilaterally deafened monkeys. These functions will define, at three major stages of the experiments, the levels of difficulty of discrimination as a direct function of (a) the type of auditory sequencing (b) its duration, and (c) the controlled delay time intervening between stimulus offset and the availability to the animal of the response keys.

Seriatim surgical lesions will be made in all the experimental animals. After initial learning, unilateral ablations of the cortex of the superior temporal gyrus will be made and then, after retraining, midline section of the anterior commissure and corpus callosum will be made.

Side of ablation and status of peripheral organ will be balanced to allow two basic questions to be answered: (1) Is there a relationship between ear and cerebral hemisphere in the performance of a learned conditioned auditory sequence discrimination? (2) What is the nature and extent of interhemispheric coordination in post-ablation performance.

GB-25869X

$50,100/2 years

FY 71

INSTRUCTIONS FOR USE

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2. Grants and Contracts Office will post grant number, amount granted and inclusive project dates on the S.I.E. copy and make distribution of remaining copies.

NSF Form 4, Jan. 1970

1. PROPOSAL FOLDER

THE POSTAL SERVICE COMMISSION

POST OFFICE DEPARTMENT
BUREAU OF RESEARCH AND ENGINEERING
WASHINGTON, D. C. 20260

SEP 3 1971

Dr. Alvin F. Meyers, Jr.
Director
Office of Noise Abatement and Control
Environmental Protection Agency
Washington, D. C. 20460

Dear Dr. Meyer:

In response to your letter of August 10, 1971, we are pleased to advise you that Mr. Richard W. Flohr has been designated as the contact for your office with the Postal Service. Mr. Flohr can be reached on 737-7314 or 961-7903.

The major emphasis in noise reduction effort in the Postal Service is in the workroom area. Public nuisance noise has not been a problem in Postal operations and we have no record of any complaint from neighborhoods adjacent to post offices.

The information requested in the Federal Noise Program's Information Outline is attached hereto.

Sincerely,

R. L. Allen
Director for Engineering
Engineering and Logistics Department
Mail Processing

FEDERAL NOISE PROGRAMS INFORMATION FOR ENVIRONMENTAL PROTECTION AGENCY

I. Organizational

A. Parent Agency, etc: Systems Engineering Design Branch, Mail Processing Group, U. S. Postal Service.

B. Legislative Requirements, etc.: None

II. Functional

A. Overall Program Objectives:

(1) Determine the feasibility and cost of lowering noise levels in existing postal equipment.

(2) Provide standards for the development of new postal equipment.

B. Specific Programs and Research

(1) "Sound and Vibration Control in Post Office Facilities" - (Project # 70300) This project utilizes a typical mechanized post-office to identify existing noise sources, determine what must be done to reduce noise levels (in steps) to NC-70, NC-65, and NC-60 at operator positions, and then implement prototype modifications. It will thus be possible to determine what the cost of a nationwide noise reduction would be to achieve any desire noise level. The project is now at the stage of modifying equipment to achieve a maximum sound level of NC-70, to be accomplished by mid-October. (NOTE: Present maximum noise levels are in the NC-85 range, with none of the levels exceeding Walsh-Healey Act requirements.)

(2) "OCR Model I Noise Reduction" (Project 71198) This project somewhat parallels the above described project, in that it concentrates on a single item of equipment also included in the first project. The OCR (Optical Character Reader) is the noisiest item of postal equipment and has thus been singled out for this special effort. Analysis and development will be similar to the above project, except that the two goals established are 70 and 65 dBa. This project is not yet under contract.

(3) Postal Service Specification POD-N-00458 (RDE), "Noise, Acoustic, Maximum Levels for Equipment; And Test Procedures For" - This specification is used in conjunction with the development of new postal equipment, to provide operator position noise levels not exceeding NC-60. The specification has only recently been issued and it is not yet known if the stringent requirements can be met without undue expense and sacrifice in equipment operability.

C. Procedures

(1) Identification of problem areas and research needs: Problem areas were identified through employee complaints. Rather than try to resolve individual complaints, it was decided to prepare a comprehensive program to evaluate all noise producing equipment culminating in the above mentioned projects. The ultimate goal is maximum sound reduction at minimum cost by cost-effectively evaluating all feasible equipment and architectural modifications.

(2) Specific actions to abate and control noise: See Item IIB.

(3) Procedures for coordination with other Federal Agencies: None

(4) Extent of inhouse capability: Fully knowledgeable in state of the art techniques in measuring, analyzing, and correcting noise problems. However, limits on staff and equipment dictate the use of consultants such as the National Bureau of Standards and IIT Research Institute.

(5) Proposed new procedures to upgrade programs: None, pending results from the projects discussed in IIB.

D. Future Program Proposals and Objectives: None

III. Fiscal

A. Current Program

(1) Real property value of facilities and equipment used for noise programs: None

(2) Current operating budget (FY 72): None for facilities. See Items 3 and 4 below.

(3) Personnel

(a) Current authorization by type and number: No one is assigned full time to noise reduction programs. Project Managers are generally at PS-17 (equivalent to GS-14) level and Project Engineers at the PS-15 (equivalent to GS-13) level.

(b) Salary totals for program operation and contract management: Approx. $15,000 per year.

(4) Contracts:

Project 70300 (See Sect. IIB): $150,000 this Fiscal Year. Project now 30% complete.

Project 71198 (See Sect. IIB): Estimated cost $20,000; contract not yet awarded.

B. Past and Future Programs

(1) Past Programs: Expenditures for personnel and contracts approx. $250,000. There has been no facilities acquisition for the purpose of noise control.

(2) Future Program Plans: This will depend largely on the results of the current projects. No change in personnel level is anticipated.

IV. Regulation and Certification

A. Authority and Responsibilities: Not applicable

B. Actions taken to Implement Regulation and Certification Requirements: Not applicable, since sound levels are below the levels prescribed in the Walsh-Healey Act.

ATOMIC ENERGY COMMISSION

414<

DRAFT
CGWelty

Atomic Energy Commission Contribution to Information for the ONAC Report to Congress on Noise Pollution Control Activities

The AEC's contribution to the ONAC report will be minimal due to the absence of signigicant environmental noise problems in all areas of AEC programmatic and regulatory authority. The information provided below is organized according to the outline, "Federal Noise Program Information" enclosed in the ONAC letter of July 30, 1971.

I. Organizational
  A. Parent Agency is the Atomic Energy Commission with subdivisions as follows:

    1. General Manager - Responsible for AEC's Operational Programs including research, development and production and associated activities.

    2. Director of Regulation - Responsible for AEC's Regulatory Program under which the nuclear activities of others are licensed and regulated.

  B. Legislative requirements and authorities for the respective AEC Programs are as follows:

    1. For the General Manager's Operational Programs:

      a. Public health and safety requirements set forth in the Atomic Energy Act of 1954, as amended.

      b. Title IV of the Clean Air Act of 1970.

      c. The National Environmental Policy Act.

    2. For the Director of Regulations Regulatory Program:

      a. The National Environmental Policy Act as it applies to nuclear activities licensed and regulated by the AEC.

II. Functional
  A. Overall Program Objectives

    1. General Manager: To protect the health and safety of the public as required by the Atomic Energy Act, to assure compliance with any environmental noise standards established pursuant to the Clean Air Act and to implement the policies and objectives of NEPA.

Draft

2. Director of Regulation: To implement the policies and objectives of NEPA.

B. Specific Programs and Research. In the absence of environmental noise problems withing the scope of activities for which the General Manager and the Director of Regulation are responsible, there are no specific AEC programs for environmental noise control or research.

C. Procedures

1. General Manager: Existing management review and appraisal programs would identify any significant noise problem areas. New procedures to upgrade these programs are not needed.

2. Director of Regulation: The * procedures ~~established~~ issued by the Director of Regulation to implement Section 102 (2) (C) of NEPA will assure that noise pollution is considered during the nuclear facility licensing process. These draft procedures are currently under revision.

D. Future Program Proposals and Objectives. There are none required.

III. Fiscal

Not applicable.

IV. Regulation and Certification. None specific to noise.

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* Federal Register Notice (36 FR 5150, March 17, 1971) of availability of draft Guide for Interim use and public comment by May 1, 1971.

UNITED STATES
ATOMIC ENERGY COMMISSION
WASHINGTON, D.C. 20545

SEP 7 1971

Mr. Alvin F. Meyer, Jr.
Director, Office of Noise Abatement
and Control
Environmental Protection Agency
Washington, D. C. 20460

Dear Mr. Meyer:

This is in response to your letter of July 30, 1971, to Mr. Joseph DiNunno. The letter was forwarded to my office for reply.

Information on AEC noise pollution control activities is provided in the enclosure to this letter and in accordance with the subject headings appearing in your outline. The AEC's contribution to the ONAC report to Congress will be minimal due to the absence of significant environmental noise problems in those activities for which the AEC has programmatic or regulatory authority.

For purposes of the ONAC inventory of objectionable noise complaints, our survey of the activities of AEC contractors and licensees indicates that there have been no complaints of objectionable environmental noise due to these activities.

Sincerely yours,

Martin B. Biles, Director
Division of Operational Safety

OS:PC:CGW

Enclosure:
As stated above

Atomic Energy Commission Contribution to Information for the ONAC Report to Congress on Noise Pollution Control Activities

The AEC's contribution to the ONAC report will be minimal due to the absence of significant environmental noise problems in all areas of AEC programmatic and regulatory authority. The information provided below is organized according to the outline, "Federal Noise Program Information" enclosed in the ONAC letter of July 30, 1971.

I. Organizational

   A. Parent Agency is the Atomic Energy Commission with subdivisions as follows:

      1. General Manager - Responsible for AEC's Operational Programs including weapons development and production, reactor research and development, and physical and biological research.

      2. Director of Regulation - Responsible for AEC's Regulatory Program for the licensing and regulation of nuclear materials and facilities.

   B. Legislative requirements and authorities for the respective AEC Programs are as follows:

      1. For the General Manager's Operational Programs:

         a. Public health and safety requirements set forth in the Atomic Energy Act of 1954, as amended.

         b. Title IV of the Clean Air Act of 1970.

         c. The National Environmental Policy Act of 1969.

      2. For the Director of Regulation's Regulatory Program:

         a. Atomic Energy Act of 1954, as amended.

         b. National Environmental Policy Act of 1969.

II. Functional

A. Overall Program Objectives

1. General Manager: To protect the health and safety of the public as required by the Atomic Energy Act, to assure compliance with any environmental noise standards established pursuant to the Clean Air Act and to implement the policies and objectives of NEPA.

2. Director of Regulation: To implement the policies and objectives of the Atomic Energy Act and NEPA as they apply to licensed activities regulated under the Atomic Energy Act.

B. Specific Programs and Research. In the absence of environmental noise problems within the scope of activities for which the General Manager and the Director of Regulation are responsible, there are no specific AEC programs for environmental noise control or research.

C. Procedures

1. General Manager: Existing management review and appraisal programs would identify any significant noise problem areas. New procedures to upgrade these programs are not needed.

2. Environmental noise effects of AEC licensed activities would be requested pursuant to AEC regulations implementing the National Environmental Policy Act of 1969 in 10 CFR Part 50, Appendix D.*

D. Future Program Proposals and Objectives. There are none required.

III. Fiscal

Not applicable.

IV. Regulation and Certification.

See II. C. 2. above.

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*Currently under revision in light of Calvert Cliffs' Coordinating Committee Inc., et al. v. AEC et al., Nos. 24839, 24871 (D.C. CA, July 23, 1971)

FEDERAL POWER COMMISSION

FEDERAL POWER COMMISSION
WASHINGTON, D.C. 20426

IN REPLY REFER TO:
PWR-ER

AUG 19 1971

Mr. Alvin F. Meyer, Jr.
Director
Office of Noise Abatement and Control
Environmental Protection Agency
Washington, D. C. 20420

Dear Mr. Meyer:

This is in reference to your letter of July 30, 1971 addressed to Mr. A. F. Bochenek of our staff, requesting information about the Commission's activities which result in noise and its programs for noise abatement and control.

As a regulatory agency, the principal activities of the Commission consist of regulation of wholesale rates of electricity moving in interstate commerce, licensing of non-Federal hydroelectric projects and the primary transmission lines associated with these projects, and the regulation of some aspects of the natural gas industry. None of these responsibilities entail operations which result in noise generation. The Commission conducts no programs related to noise abatement. We feel, therefore, that the Commission's work is not affected by Section 402(c) of the Clean Air Act of 1970.

Although we are not directly involved at present in noise pollution problems of the utilities, there are some problems and probably will be more as time passes. We would be glad to participate in local meetings related to noise problems and shall appreciate your continuing to notify us of the schedules. You may direct such notices to me in the future.

Very truly yours,

T. A. Phillips

T. A. Phillips
Chief, Bureau of Power

STATE DEPARTMENT

DEPARTMENT OF STATE
WASHINGTON

IN REPLY REFER TO:

September 1, 1971

Mr. Alvin F. Meyer, Jr.
Director, Office of Noise Abatement and Control
Environmental Protection Agency
Washington, D. C. 20460

Dear Mr. Meyer:

The Department of State does not have at present a noise abatement program.

Facilities used by the Department of State in the United States are acquired through the General Services Administration who are responsible to see that the space is adequate to permit employees to work in healthful surroundings, and that noise level tolerances are met.

Equipment used is purchased from reputable manufacturers and produces the least amount of operating noise possible.

A negative report is therefore submitted on information requested in paragraph two of your letter of July 30.

The Department is in full accord with the noise abatement program and will assist and support the program in every way possible.

Sincerely yours,

Max L. Shimp

Max L. Shimp
Safety Director

TENNESSEE VALLEY AUTHORITY

TENNESSEE VALLEY AUTHORITY
CHATTANOOGA, TENNESSEE 37401

September 2, 1971

Dr. Alvin F. Meyer, Jr.
Director of the Office of Noise
Abatement and Control
Environmental Protection Agency
Washington, D. C. 20460

Dear Dr. Meyer:

This is in reply to your request that we supply Federal noise program information. TVA has done a limited amount of work in the area of community noise control, although no formally organized approach has yet been undertaken on an Agency-wide scale.

The enclosed information follows the outline suggested in your letter to James A. Oppold.

Sincerely yours,

F. E. Gartrell, Dr. P. H.
Director of Environmental
Research and Development

Enclosure

NOISE CONTROL PROGRAM

TENNESSEE VALLEY AUTHORITY

I. Organizational

A. Parent agency, department, etc.

Tennessee Valley Authority
Office of Health and Environmental Science
Division of Environmental Research and Development
Industrial and Radiological Hygiene Branch

B. Legislative requirements and authority for noise function and finding

Tennessee Valley Authority Act as amended

II. Functional

A. Overall program objective

To identify and control all noise sources associated with operation of TVA facilities which may be a public nuisance or hazard

B. Specific programs and research (by individual projects)

No research is being conducted by TVA in community noise.

1. Effects of gas turbine generating plant on community noise levels - T. H. Allen Steam Plant, Shelby County, Tennessee, and Colbert Steam Plant, Colbert County, Alabama

a. Description

Community noise levels will be studied to determine the influence of gas turbine noise.

b. Objective

(1) Is the program meeting desired objectives? So far, it is.

(2) What criteria are used to evaluate the program? The incidence and nature of noise complaints from residents of the community

C. Procedures

1. Identification of problem areas and research needed. How are priorities assigned?

1. (Continued)

Research is needed on improved methods of predicting noise levels from proposed new plants and on improved methods of measuring, analyzing, and controlling noise.

Priorities are assigned with respect to expected noise levels at the nearest community residence. Highly populated residential areas are given highest priority.

2. Specific action to abate and control noise

When complaints come to TVA from the community, an investigation is made of the noise source. Sound measurements are made and controls implemented if needed. For instance, emergency relief or vent-down valves may be equipped with mufflers. Air blast circuit breakers near residential areas are being installed with noise mufflers.

3. Procedures of coordination with other Federal agencies

Every effort is made by TVA to coordinate and cooperate with other Federal agencies in industrial hygiene, radiological health, and other areas of environmental control. The same policy would be followed in community noise studies.

4. Extent of inhouse capability including consultant usage

The Industrial and Radiological Hygiene Branch is staffed with six industrial hygiene engineers and four engineering aides. This staff carries out most of the activities in noise assessment and control. No specialists in noise are employed and no consultants are retained.

5. Proposed new procedures to upgrade programs

A standard containing engineering criteria for noise control will be developed as soon as consensus noise standards are made available to TVA. The Industrial and Radiological Hygiene Branch hopes to employ a professional acoustical engineer for use in noise abatement activities. An engineering aide to the acoustical engineer will also be employed.

D. Future program proposals and objectives

Community noise effects and control are treated in environmental statements for TVA projects. No specific proposals have been made for community noise control. The major noise problems in TVA involve the occupational environment, particularly in the steam-electric generating plants.

III. Fiscal

A. Current program

1. Real estate value of facilities and equipment used for noise programs

   Estimated $12,000 to $15,000 as of end of fiscal year 1971 for noise surveillance and monitoring only. Estimates not presently available of additional costs involved for control of noise at TVA installations.

2. Current operating budget (fiscal year 1972)

   No specific funds are designated for community noise study and control. These are activities funded from the general industrial hygiene budget.

3. Personnel

   a. Current authorization by type and classification

      No technical persons have sole responsibility in community noise assessment and control. Six industrial hygiene engineers and four engineering aides are assigned as needed to community noise problems when they arise.

   b. Salary totals for program operation and contract management

      See items 2 and 3 above

4. Contracts, grants, loans, and subsidies

   None

B. Past and future programs

1. Past programs

   a. Expenditures for past 3-5 years

      Community noise efforts are requiring about 2 man-years per year (about $40,000 in fiscal year 1971) plus the purchase of noise-measuring and analyzing instrumentation (approximately $5,000 in fiscal year 1971).

   b. Facilities acquisitioned for past 3-5 years

      None

2. Future program plans

   a. Projected facility costs

      None

   b. Projected personnel levels

      Acoustical engineer, fiscal year 1972
      Industrial hygiene engineer, fiscal year 1972

IV. Regulation and certification

A. Authority and responsibilities

Authority and responsibility for noise control are vested in the TVA organization responsible for the operation of the facilities involved. TVA plans to develop standards and criteria for use by design and operating organizations in community noise control.

B. Actions taken to implement regulation and certification requirements

TVA has no regulatory authority with regard to control of community noise.

TREASURY DEPARTMENT

430<

OFFICE OF THE SECRETARY OF THE TREASURY
WASHINGTON, D.C. 20220

AUG 30 1971

MEMORANDUM TO: Mr. Alvin F. Meyer, Jr.
Director, Office of Noise Abatement and Control
Environmental Protection Agency

FROM: Richard E. Slitor
Assistant Director, Office of Tax Analysis

SUBJECT: Federal Noise Programs Information

On the basis of a canvass of the various Treasury bureaus, offices, and services, it seems fair to say that the Department has no substantial noise emission problems affecting the public and no very substantial procedures or programs dealing with noise effects and abatement in the occupational noise area.

The major problems of external noise seem to be in the Bureau of the Mint. These are discussed in the attached report by Mr. Sidney F. Carwile, Acting Director of the Mint. The Mint also has a substantial problem of internal or occupational problem noise in connection with its coin stamping machines which produce coin blanks and then stamp them into coins. This is handled in part by acoustical tiles but chiefly by employees' ear protective devices. Other sound damping measures such as protective panels around the machines would interfere unduly with operations.

The Bureau of Engraving and Printing has some internal or occupational noise problems which are discussed in the attached report from Mr. W. R. May, Safety Officer, Office of Industrial Relations, Bureau of Engraving and Printing.

The Internal Revenue Service has corrected minor occupational noise problems in the use of certain mechanical devices in handling taxpayer forms. This problem was encountered and surmounted some years ago. At the present time they have whatever occupational noise problems are associated with large computer installations and processing centers. These are deemed to be minor and no corrective programs seem to have been called for to date. A copy of the Internal Revenue Service report is attached. (To be supplied.)

The Secret Service operates or manages several firing ranges for pistol and rifle practice. Their noise problems, almost entirely internal in character, have been dealt with by conventional methods, including the use of sound absorbent materials, acoustical baffles, and ear protectors for employees exposed to the sound of firing. A copy of their report is attached. (To be supplied.)

This brief report is designed to cover both the inventory of known noise emission sources which are objectionable per Section 402(c) of Title IV and the comprehensive information requested for use in the report to Congress in accordance with the instruction outline contained in your letter of July 30.

Attachments

OPTIONAL FORM NO. 10
MAY 1962 EDITION
GSA FPMR (41 CFR) 101-11.6
UNITED STATES GOVERNMENT

Memorandum

TO : Mr. Richard E. Slitor
Asst. Director, Office of Tax Analysis
Treasury Building, Room 4205

DATE: August 25, 1971

FROM : Sidney F. Carwile
Acting Director of the Mint

SUBJECT: Federal Noise Programs Information

Confirming your recent detailed discussion with Mr. Johnson on the need for detailed information on Federal Noise Programs Information, both external emissions, and internal noise control, we are attaching a report for the Environmental Protection Agency.

5010-108

Buy U.S. Savings Bonds Regularly on the Payroll Savings Plan

Federal Noise Programs Information

I - Organizational

A - This report covers the entire Bureau of the Mint, Treasury Department, who operate coinage mints in Philadelphia, Pa., Denver, Colorado and San Franciso, California. There is also a United States Assay Office at New York, with a Bullion Depository at West Point, New York and our Bullion Depository at Fort Knox, Kentucky, where the Nations stock of gold is stored.

B - We currently have nô need for Legislation or Special Authority for Noise Function and Funding.

II - Functional

A - The overall program objective of the Bureau of the Mint would be to eliminate all external noise emissions affecting the general public. We wish also to maintain at an absolute minimum the internal noise that may be detrimental to the welfare of our employees.

B - Specific Programs:

1. Currently we have three sources of external noise emissions that have caused public complaint. They are the noise emissions from our scrubbers on our melting furnace exhausts at our Philadelphia Mint, noise emissions from our rolling mills at our Denver Mint, and noise emission from our presses at the San Francisco Assay Office which is currently minting coins.

2. Our objective is to cut down if not completely eliminate these external emissions.

a - Our current program has not fulfilled our objective.
b - No specific criteria is used to evaluate the program. We have somewhat minimized the effect but not cured it.
c - Procedures
  1. The problem areas are known and many attempts have been made to improve the condition. The priorities are in the order as mentioned in B - 1.
  2. No specific action other than our own efforts.
  3. No coordination with other Federal agencies.
  4. Consultants and field teams from PHS have been made aware of our problems, with nothing tangible offered.
  5. No contemplated new procedures being planned.

d - Future Program Proposals and Objectives

We are continuing our efforts to erradicate the external noise from our scrubbers in Philadelphia. In Denver, the proximity of our rolls to the windows, which have to be opened in the summer, have made this project almost unsurmountable. In San Francisco, the noise coming out of open windows is difficult to overcome in our neighborhood.

III - Fiscal

A. Current Program

1,2,3, & 4 no appropriated funds for our requirements, nor has any specific personnel been expressly assigned to any of the projects.

B. Past and Future Programs

1 a. - On a continuing basis, we have done what could be done to keep noise at a minimum. The record of expenditures for this purpose has not been detailed.

1 b. - No facility aquisitions in the past 3 to 5 years.

2 a. - There is no current knowledge of what projected facilities costs may be.

2 b. - No knowledge of projected personnel levels in any facilities. These vary considerably with our production requirements.

IV - Regulation and Certification

A - We are knowledgeable of our authority and our responsibility to make corrections.

B - Prior to the Clean Air Act of 1970, we did improve on a continuing basis our noise problems. We have never accomplished all that needs to be done. The use of noise absorbing devices is not too practical in some of our facilities. With sufficient funding and the use of accoustical experts, either from government or the private sector, much may be accomplished. The Office of Noise Abatement and Control may be interested in visiting our facilities and on a first hand basis, become knowledgeable of our problems. It will be noted that in Philadelphia, the external emission of noise from our rolls and stamping presses is not a factor due to the design of our new building. Our external emission problem in this facility is only from the exhaust of our scrubbers. In Denver and San Francisco, we are operating in old buildings and at times with the windows open, the external emissions are quite high. Denver is in the process of building a new facility at a new location and a newer design would eliminate many of its current problems. San Francisco has a facility in a highly populated neighborhood and some definite changes may be called for here.

UNITED STATES GOVERNMENT

Memorandum

BUREAU OF ENGRAVING AND PRINTING

TO : Mr. Richard E. Slitor
Assistant Director
Office of Tax Analysis
The Department of the Treasury

DATE: August 25, 1971

FROM : W. R. May, Safety Officer
Office of Industrial Relations

SUBJECT: Federal Noise Programs Information

According to information from our Office of Engineering, Office of Research and Technical Services, and the Safety Office, this Bureau does not have any noise problems that have an effect on the public welfare.

The few internal noise problems that might have had an effect on our employees were corrected by the installation of acoustical tile, changing air motors to electric motors on a panagraph machine, and providing employees with earmuffs and cotton ear plugs.

We have the capability to take audiometer readings and they are taken when we feel the sound levels might be high due to some new equipment installations.

In summary, the Bureau of Engraving and Printing does not appear to have any noise emission problems that meet the criteria mentioned in Mr. Alvin F. Meyer, Jr.'s letter of July 30, 1971.

OPTIONAL FORM NO. 10
MAY 1962 EDITION
GSA FPMR (41 CFR) 101-11.6
UNITED STATES GOVERNMENT

Memorandum

TO : Mr. Richard E. Slitor
Office of Tax Analysis

DATE: August 31, 1971

U.S. Secret Service
File No. 616.92

FROM : Chief, Administrative Operations
Division, U.S. Secret Service

SUBJECT: Noise Abatement and Control

As you know, the U.S. Secret Service does not operate any noise producing items that would affect the general public. However, our employees are subjected to noise in firing ranges that exceed safe levels.

The Department of Health, Education, and Welfare conducted a study recently which included certain recommendations on noise control in firing ranges. As a result of their findings, we have instituted the following controls:

1. All shooters must wear protective ear muffs or ear plugs when firing.
2. All range officers and firearm instructors should wear protective ear muffs or be fitted with custom ear plugs.
3. Shooters in waiting areas should stand away from the open door to the firing ranges unless they wear ear protection.
4. A hearing conservation program which must include periodic audio-metric testing for employees of the firing range has been instituted.
5. Ear protection and a hearing conservation program has been extended to all of our firing ranges.
6. Ranges under construction will include rigid specifications to insure that maximum noise control measures have been included.

Please contact me at extention 8558 if you require any further information.

M Kerneklian

M. Kerneklian

5010-108

Buy U.S. Savings Bonds Regularly on the Payroll Savings Plan

memorandum
[illegible]

to: Mr. Richard Slitor, Assistant Director
Office of Tax Analysis, Department of the Treasury

from: Chief, Protective Programs Branch A:FM:PR

subject: Noise Control

As requested, attached is the portion of our regulations in the Internal Revenue Manual pertaining to identifying and reporting hazardous conditions which might be injurious to our employees. These requirements have been in effect in the Treasury Department for many years.

I am not aware of the existence of any specific noise problem affecting Service employees nor have any been reported to my office in recent years. The only incident I recall occurred in the late 50's, I believe, in our Southwest Region. An employee alleged a hearing loss as a result of operating a bursting machine. We had the Public Health Service make a survey and provide recommendations upon which we acted at the time.

If there are any noise problems in the Service, they would probably be in the computer rooms at our key data processing facilities. However, we do not believe that noise in this area exceeds any established standards. Since we are not aware of any problem, we do not have any positive program of control.

I am not aware of any noise emission problems emanating from any Service installation which affects the public.

Edward E. Dougherty
Edward E. Dougherty

Attachment

MANUAL TRANSMITTAL

1(16)00-18

INTERNAL REVENUE SERVICE ★ Date of Issue: October 17, 1966

Purpose

This Memorandum transmits revised text for IRM 1(16)10, Safety Program.

Removal and Insertion of Pages

Remove

Table of Contents 1(16)00 — 1(16)66
Text 1(16)00 — 1(16)15.3
Exhibits 1(16)10-1 — 1(16)10-9—Cont.

Insert

Table of Contents 1(16)00 — 1(16)66
Text 1(16)00 — 1(16)16.7:(4)
Exhibits 1(16)10-1 — 1(16)10-11—Cont.

Nature of Changes

This Section has been changed to conform with the new Treasury Regulations for Reporting Accidents, Conducting Investigations and Processing Claims and Treasury Regulations under the Military Personnel and Civilian Employees' Claims Act of 1964. Other changes have been made to provide uniformity of terminology, establish procedures for determining eligibility for safety awards, and to reflect other changes in the program. Some of the more significant changes are:

IRM 1(16)11.4 has been amended to assign the National Office Facilities Branch the responsibility for the accident and fire prevention programs for the National Office complex.

IRM 1(16)11.5 and other subsections, as appropriate, have been amended to require the preparation of Optional Form 26, Data Bearing Upon Scope of Employment of Motor Vehicle Operator, in addition to the Standard Form 91 for each automobile accident.

IRM 1(16)11.6 has been changed to provide a more specific criteria for participation in field Federal Safety Councils.

IRM 1(16)12.3 has been added to require each region and the National Office Facilities Branch to submit a monthly memorandum report showing mileage driven by Service-owned or operated vehicles.

IRM 1(16)13.6 has been added to reflect reports required of the field and the National Office Facilities Branch.

IRM 1(16)14.32 and 1(16)14.33 have been changed to broaden the criteria for informal and formal investigations. Formal investigations will not be required unless property damage exceeds $250 and other criteria are met. This change has been reflected throughout the section wherever applicable.

IRM 1(16)14.34 has been added to establish procedures specifically for reporting accidents involving GSA vehicles to the GSA Motor Pool Manager. This report is in addition to accident reports required elsewhere in IRM 1(16)10.

IRM 1(16)14.41 has ben amended to require that Standard Form 91 and Optional Form 26 be forwarded to the supervisor within 24 hours after the accident. It also requires the supervisor to forward necessary reports within 48 hours after the accident; eliminates notification of an employee's return to duty status; and requires instead that an estimate of the man days of expected loss be shown in Item 21 on Standard Form 92.

IRM 1(16)14.42 has been amended to no longer require the preparation of the Annual Federal Tort Claims Report but includes a requirement for an Annual Report on Claims Paid Under the Military Personnel and Civilian Employees' Claims Act of 1964.

IRM 1(16)14.52 has been added to establish procedures for handling claims filed by Service employees under the provisions of the Military Personnel and Civilian Employees' Claims Act of 1964.

IRM 1(16)14.53 has been added to clarify those circumstances when an employee may advise private parties of their rights to file claim against the Service without such advice being considered encouraging or soliciting claims.

IRM 1(16)14.6 has been added to require reporting to his supervisor immediately any citations for a traffic violation resulting in an accident while on official business and to provide legal counsel to any Service employee in this connection.

IRM 1(16)15.1 through 1(16)15.23 have been changed to show the use of the Commissioner's Safety Award which replaces the Secretary's Safety Award; to change the period for permanent possession of the Annual Regional and Annual Service Center Safety Awards; to include the Internal Revenue Service Data Center as being in competition for the Commissioner's Safety Award; and to reflect that the disabling injuries at service centers will now be changed against the regional disabling injury frequency rate in determining the winner of the Annual Regional Safety Award.

IRM 1(16)15.3 has been added to require maintenance of accident statistics by regional and district offices, service centers, and the National Office Facilities Branch for determining eligibility for safety awards; sets forth the procedures to be followed in computing eligibility; and requires notification to the Protective Programs Branch, National Office, when components become eligible for an award.

IRM 1(16)16 has been added to provide guidelines and procedures for a Board of Inquiry in determining the cause of all work-connected accidents or occupational diseases which result in death or serious injury to Service employees or to non-Federal persons as a result of Service activities, and recommending corrective action to prevent recurrences.

This procedure also requires a report to the Assistant Regional Commissioner (Administration), or the Assistant Commissioner (Administration) for National Office employees, by TWX or telephone within 18 hours after such accident or occupational disease. The information will be immediately forwarded by TWX or telephone to the Chief, Protective Programs Branch.

Effect on Other Documents

The following Manual Supplements *remain in effect* supplementing IRM 1(16)10:

CR 1(16)G-4, dated December 27, 1961

CR 1(16)G-4, Amend. 2, dated November 8, 1963

The following Manual Transmittals are now obsolete:

1(16)00-14, dated December 28, 1964
1(16)00-15, dated January 25, 1965

Bruce McNair

Bruce McNair
Director, Facilities Management Division

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1(16)10 SAFETY PROGRAM

1(16)11 General Provisions

1(16)11.1 SCOPE

(1) Accidents involving Government property and employees represent great annual loss, not only in money but in employee efficiency and suffering resulting from injury or death occurring in many such accidents. A large percentage of the yearly accident total can be prevented and loss to the Government can be materially reduced if every employee of the Internal Revenue Service accepts his or her responsibility for maintaining a constant personal effort to prevent accidents.

(2) The Internal Revenue Service safety program is aimed at preventing accidents and consists generally of the promotion of "safety-consciousness" among employees through training and education: participation in fire drills; enforcement of safety instructions: indoctrination of personnel in safe driving practices; as well as other methods which tend to ensure the safety of employees and to substantially reduce accidents and injuries. In addition, the program includes the immediate reporting and investigation of accidents; prompt analysis of accidents and corrective action to prevent recurrence: inspections for physical hazards in offices and elimination of such hazards when discovered; and specific rules for use and inspection of motor vehicles.

1(16)11.2 AUTHORITY

Public Law 357, approved October 14, 1949 (which amends the "Federal Employees' Compensation Act"), authorizes and directs the heads of all agencies and departments to develop, support and foster organized safety programs for the purpose of reducing the number of accidents and injuries among Government employees.

1(16)11.3 OBJECTIVES

It shall be the objective of the Internal Revenue Service to reduce to an absolute minimum the number of accidents and injuries to employees and to the public as a result of its operations; to encourage safe practices; and to eliminate work hazards and health risks.

1(16)11.4 RESPONSIBILITIES

(1) The Assistant Commissioner (Administration) has overall responsibility for the development, coordination and administration of the Service program for accident and fire prevention, accident reporting, and handling of claims.

(2) The Protective Programs Branch, A:FM:PR, is directly responsible for the formulation and coordination of the overall Service safety program; the development of accident reporting procedures; the final review of all accident reports for adequacy and for ensuring that all necessary corrective action has been taken; for maintaining the original files of accident reports submitted in accordance with prescribed procedures; and settling and coordinating the handling of all claims submitted under the Federal Tort Claims Act and the Military Personnel and Civilian Employees' Claims Act of 1964 (P. L. 88-558).

(3) Regional Commissioners are responsible for the safety of all personnel under their jurisdiction and shall ensure the installation and development of adequate accident and fire prevention programs within their respective regions. Officials, supervisors, and employees in the offices of the Regional Inspector and Regional Counsel are requested to cooperate and participate in these programs.

(4) The National Office Facilities Branch, is responsible for developing and administering adequate accident and fire prevention programs for the National Office complex.

(5) Supervisors and officials at all levels in both the National Office and the field are responsible for the day-to-day operation of safety programs within their organizational units. They are expected to train all employees in safe practices, to make every effort possible to correct safety and fire hazards, and to reduce accidents through such methods as:

(a) Enforcement of compliance with specific safety instructions;

(b) Prompt investigation and analysis of accident reports with corrective action, when necessary;

(c) Periodic inspections during the day of space not constantly occupied by personnel where a definite fire hazard exists;

(d) Establishment of "No Smoking" areas where fire hazards exist; and

(e) Encouragement of employees to participate in first aid and other types of training in safety.

(6) Employees shall report all physical and health hazards to their supervisors.

(7) Responsibility for coordinating the safety program should be vested at all major levels in one person who should be designated as safety officer.

1(16)11.5 TRAINING AND EDUCATION

(1) "Safety-consciousness" among employees should be promoted through such methods as:

(a) Procuring and using, where necessary, technical and educational publications, posters, and other material from the National Safety Council and other sources;

(b) Discussing specific safety problems at staff meetings and employee meetings, as appropriate; and

(c) Introducing safety into training programs for employees engaged in duties which experience has shown produce frequent injuries.

(2) Safety training should be made available to safety inspectors, key supervisors, persons responsible for a safety program, or other employees as appropriate. Such training is authorized under the Government Employees'

(1(16)11.5 TRAINING AND EDUCATION—Cont.)

Training Act and may be provided by the Department of Labor or non-Governmental sources such as the National Safety Council.

(3) All employees should be instructed as to the location of the nearest fire alarm box; how an alarm must be turned in; responsibility for turning in alarm immediately; the need for closing windows and doors and leaving the building without crowding and undue haste in the event of fire; location of the emergency room or first aid station; the need for treatment; and the proper reporting of injuries or accidents.

(4) The Treasury Department Safety Council "Driver's Manual" should be made available to each driver of Government-owned vehicles and privately-owned vehicles on official business. These drivers should be instructed as to their responsibility for safe driving; for reporting accidents; and for keeping a Form 2021, Vehicle Accident Instructions, on their person, a SF-91, Operator's Report of Motor-Vehicle Accident, Optional Form 26, Data Bearing Upon Scope of Employment of Motor Vehicle Operator, and any other required forms in their vehicles at all times. Vehicles used by enforcement personnel need not contain these items if the official in charge of the activity feels that they might cause the identity of the employee to become known and result in danger to the employee or a lessening of the effectiveness of his enforcement activities. This does not, however, exempt enforcement employees from completing the required forms in the event of an accident.

1(16)11.6 ADDITIONAL ACCIDENT PREVENTION ACTIVITIES

(1) Additional aids in the development of an effective accident prevention program are:

(a) Arranging through General Services Administration, the Department of Labor, or other appropriate agency for occasional safety inspections by safety engineers or other trained personnel, when deemed necessary, in addition to our own periodic inspections;

(b) Arranging for occasional inspections for fire hazards by the fire department or other appropriate local organizations;

(c) Where necessary in small offices, establishing first aid stations maintained by an employee trained in first aid who would be responsible for treatment of minor injuries, arranging ambulance service, maintaining lists of emergency telephone numbers, making referrals, in cooperation with the responsible supervisory officials, to the proper Federal medical officers, and other related assignments. Personnel officials have primary responsibility for the employee health program which includes all of the activities itemized in this paragraph. (Criteria for establishing first aid stations can be found in the Treasury Personnel Manual, 792);

(d) Conducting fire drills, as necessary, for purposes of testing evacuation plans and instructing employees. The size and training of building fire organizations will, of course, depend on the extent to which fire hazards exist, building construction and the like. For instance, if the building is one having a high potential fire hazard, periodic drills to acquaint employees with the best manner of evacuation in event of fire should be held, and there should be well-trained employees who can handle the initial fire fighting duties until the arrival of the fire department. On the other hand, such extensive an organization and training is not necessary in a reasonable fire-resistant building. The degree of preparation is a matter of judgment, to be determined locally, with the determination being made on the basis of providing the maximum protection for Internal Revenue Service employees. Local fire departments and GSA will aid in determining the fire hazard potential of buildings; and

(e) Representation, active participation, and attendance at meetings of Field Federal Safety Councils in all cities in which Service offices of at least 50 employees are located. If, in the opinion of the responsible official, there are reasons why continued participation in the activities of a local Council are no longer warranted, a memorandum containing the circumstances and a recommendation should be forwarded through channels to the Chief, Protective Programs Branch, for further action.

1(16)12 Motor Vehicle Safety

1(16)12.1 DRIVING PERMITS

No employee shall be permitted to drive a Service-owned vehicle, or a privately-owned vehicle on official business, unless he has a driving permit for operation of the type of vehicle to be used, and his physical condition is such that he is capable of driving the vehicle in a safe manner.

1(16)12.2 INSPECTIONS

(1) Each Government-owned vehicle must be periodically examined to determine whether it is in safe mechanical operating condition. Cars not in such condition shall be placed "out of service" until properly repaired.

(2) No seized cars, particularly those which have been adapted by the installation of more powerful engines than normal or have had other basic adaptations, shall be used until they are examined by a competent mechanic and declared to be in safe mechanical operating condition.

1(16)12.3 MONTHLY MILEAGE REPORTS

(1) Each region and the National Office Facilities Branch will submit to the Protective Programs Branch A:FM:PR, a monthly memorandum report (Report Symbol NO-A:FM-91) showing mileage driven by these two categories of vehicles:

(a) Internal Revenue Service-owned and GSA assigned;

(b) Commercial and GSA Pool vehicles.

(2) This report is due in the National Office by the 15th of the month following the reporting period.

(1(16)12.3 MONTHLY MILEAGE REPORTS--Cont.)

(3) Since this information is normally available on a quarterly basis, estimates will be submitted for the first and second months and the report for the third month will be adjusted to reflect actual mileage for the quarter.

1(16)13 Physical Hazards in Offices

1(16)13.1 APPOINTMENT OF SAFETY INSPECTORS

(1) Each Regional Commissioner will ensure the appointment of safety inspectors for the regional office and all district and local offices.

(2) Each Division Director will appoint safety inspectors for all National Office space occupied by his division.

(3) A sufficient number of safety inspectors should be designated so that no individual spends more than four hours per quarter (including time for filling out reports) in safety inspection duties, and each inspector should receive a definite assignment of space to be inspected.

1(16)13.2 FREQUENCY OF INSPECTIONS

(1) Inspections of all office space for physical hazards shall be made once each quarter, but special inspections are required immediately:

(a) When there has been a major shift of furniture or equipment within the same general area or a move from one office to another;

(b) Upon the installation of equipment which might contain or create safety hazards; and

(c) Whenever the existence of a hazard becomes known to the person responsible for safety inspections, and he believes an inspection is necessary prior to taking corrective action.

1(16)13.3 DUTIES OF SAFETY INSPECTORS

Safety inspectors will inspect the office space assigned to them for the hazards listed in Part II of Form 1775, Report of Physical Hazards in Offices, (see Exhibit 1(16)-10-1), as well as any other hazards that may be observed. If a hazard is discovered which can be corrected "on the spot," the safety inspector should advise the person in charge of the immediate area and see that the correction is made. If this does not remedy the situation, the Form 1775 is to be completed and forwarded for action to the official in charge of the office or the Division Director.

1(16)13.4 REPORTS—FIELD

(1) Form 1775 with explanations and recommendations will be completed and forwarded by local offices to the district office and by the district offices to the regional office for those hazards which cannot be corrected locally or require the expenditure of funds which the particular office is not authorized to obligate. Report Symbol NO-A:FM-22 is assigned.

(2) The Assistant Regional Commissioner (Administration) should promptly telephone, if the situation is serious enough, or send a memorandum report to the Protective Programs Branch, A:FM:PR, when it is determined that a hazard exists which cannot be corrected by the regional office, General Services Administration, or other responsible agency for lack of funds or for any other reason. The report should cover details of the problem including steps taken to correct the condition, estimate of funds required, and recommendations for National Office action. Report Symbol NO-A:FM-22 is assigned.

1(16)13.5 REPORTS—NATIONAL OFFICE

(1) Each Division Director will see that an original memorandum report of any unusual items or items of interest in connection with general hazards found and corrected within the division is sent to the Facilities Management Division, A:FM:N, as they occur. Report Symbol NO-A:FM-54 is assigned.

(2) On the basis of the safety inspection reports, each Division Director will follow normal requisitioning procedure in the preparation of requests for correction of minor hazards, such as those requiring installation of electrical outlets, moving of furniture, etc. The completed Form 1775, Report of Physical Hazards in Offices, should be attached to the requisition and forwarded to the Facilities Management Division, A:FM:N, for action. If the hazard cannot be corrected for lack of funds or for any other reason, a memorandum report should be forwarded to the National Office Facilities Branch, A:FM:N, in which a complete explanation of the situation and recommendations as to corrective action are made.

1(16)13.6 REPORTS—GENERAL

(1) Each regional office and the National Office Facilities Branch is to report by memorandum, original only, to the Protective Programs Branch, A:FM:PR, as they occur, any unusual items concerning general hazards found and corrected that could be used to promote the accident prevention program (Report Symbol NO-A:FM-54).

(2) One copy of regional, district, service center or National Office issuances concerning accident prevention, not otherwise required to be furnished the National Office, should be forwarded to the Protective Programs Branch, A:FM:PR, in order to keep the National Office informed of accident prevention activities.

1(16)13.7 CORRECTION OF HAZARDS

Every employee shall cooperate with the safety inspectors in making "on the spot" correction of hazards. Every reasonable effort will be made by all responsible officials to correct hazards.

1(16)14 Accidents, Reports, Investigations, Claims

1(16)14.1 GENERAL

(1) An effective accident prevention program requires prompt reporting and investigations of accidents and corrective action when indicated, in order to:

(a) Aid in eliminating causes of accidents;

(1(16)14.1 GENERAL--Cont.)

(b) Help in obtaining factual data required to defend the Government against claims or suits or aid in the prosecution of claims in the Government's favor; and

(c) Protect the rights of injured employees (see IRM 1920).

1(16)14.2 DEFINITIONS

(1) As used in these instructions, the following terms mean:

(a) *Accident* is an occurrence or mishap which:

1 Takes place while the employee is on official duty and causes his injury, death or occupational disease;

2 Causes injury or death to any other person if an Internal Revenue Service employee on official duty is involved or the event occurs on property under Internal Revenue Service jurisdiction;

3 Causes damage to property of the Internal Revenue Service;

4 Causes damage to property of others if:

a Internal Revenue Service equipment or property is involved, or

b An Internal Revenue Service employee on official duty is implicated.

(b) *Motor Vehicle* is any self-propelled powered device by which a person or property may be transported, excluding self-propelled devices operated within a building for loading and transporting purposes, such as fork lifts, baggage carriers, elevators, etc.

(c) *Federal employee* is an employee of any department or agency of the Federal Government while acting within the scope of his official duties.

(d) *Non-Federal* person is any person not employed by the Federal Government. (For the purpose of these instructions this includes all Federal employees while not on official duty or while acting outside the scope of their employment.)

(e) *Disabling injury* is an accidental injury or occupational disease which occurs in the course of employment and renders an employee unable to return to a regularly assigned job on the following day or shift or to perform a regularly established job on any day or shift subsequent to the day of injury.

(f) *Informal investigation* consists of the completion of the required accident reporting forms and does not normally require a separate written report.

(g) *Formal investigation* is a thorough and detailed inquiry made by Inspection and requires a written report covering all facts obtainable pertaining to the accident.

1(16)14.3 ACCIDENT REPORTS AND INVESTIGATIONS

1(16)14.31 General

The type of report or investigation required will be determined by the type of accident involved. The guides set out below do not cover all possible types of accidents but they do outline in general terms rules for determining action required. Where the circumstances do not fall within these general rules, accidents should be called to the attention of the Protective Programs Branch with request for specific handling instructions. (See Exhibit 1(16)10 2.) In those cases where it is administratively determined that a formal investigation is not warranted, an informal investigation should be conducted in lieu thereof.

1(16)14.32 Informal Investigations

(1) Informal investigations and reports will be made under the following circumstances:

(a) Accidents involving *solely* disabling or non-disabling personal injury or death of an Internal Revenue Service employee while in a duty status and acting within the scope of employment. Only an informal investigation is required because such an accident falls within the purview of the "Employees' Compensation for Injuries" statute (See IRM 1920). However, a formal investigation may be made in lieu of an informal for death or serious injury when it is necessary for the Board of Inquiry to properly discharge its responsibility. In this case the formal investigation should be requested under authority or IRM 1(16)14.33:(1)(d);

(b) Motor vehicle accidents causing damage *solely* to Government-owned cars, regardless of amount of damage, except if the damage is $250 or more and the circumstances indicate a reasonable possibility of a claim against a non-Federal person (See IRM 1(16)14.33:(1)(b));

(c) *All* motor vehicle accidents causing *solely* damage to cars owned by employees and being operated on a reimbursable basis in the conduct of Internal Revenue Service business, regardless of amount of damage;

(d) When other Government property is damaged to an extent of more than $25 but less than $250, and the circumstances indicate the possibility of a claim against a non-Federal person(s);

(e) As a result of any fire involving or occurring on property under Internal Revenue Service jurisdiction, regardless of amount of damage; and

(f) When private property is damaged to an extent of less than $250 as a result of Internal Revenue Service activities.

1(16)14.33 Formal Investigations

(1) Formal investigations will be conducted and reports prepared under the following circumstances:

(a) When a non-Federal person suffers a personal injury or death as a result of an accident involving Internal Revenue Service activities unless the Assistant Regional Commissioner (Administration) with the Concurrence of the Regional Counsel in the field or the Director, Facilities Management Division, with the concurrence of the Chief Counsel in the National Office, determine from the circumstances that a formal investigation is not warranted;

(b) When Government property is damaged to an extent of $250 or more under circumstances which indicate a reasonable possibility of a claim against a non-Federal

(1(16)14.33 FORMAL INVESTIGATIONS—(Cont.)

person(s), except where there is a clear showing that payment for damages has been or will be made under private insurance coverage of the party at fault:

(c) When private property is damaged to an extent of $250 or more as a result of Internal Revenue Service activities, except as follows:

1 Damage to cars owned by employees and being operated on a reimbursable basis;

2 Where there is a clear showing that payment for damages has been or will be made under private insurance coverage of the party at fault; and

(d) When specifically requested by competent authority.

(2) Formal investigations will incorporate all reports (except C.A. Forms, Standard Form 91A, Investigation report of Motor Vehicle Accident, and Standard Form 92, Supervisor's Report of Accident) completed by the employee involved and his supervisor, as well as a detailed narrative statement by the investigator.

1(16)14.34 INVESTIGATIONS INVOLVING GSA VEHICLES

In addition to other required reports of motor vehicle accidents, any accident involving a General Services Administration vehicle shall be reported to the GSA Motor Pool Manager. The initial notification shall be by telephone, if possible, to the Motor Pool Dispatcher, and followed up by written report to the Manager of the Motor Pool Unit within 48 hours from the time of the accident. Copies of Standard Forms 91, 91A, and Optional Form 26, or the formal investigation without exhibits, may be used to satisfy the written report requirement.

1(16)14.4 ACTION REQUIRED

1(16)14.41 Informal Investigations

(1) In accidents involving informal investigations (see IRM 1(16)14.32), the following employees will take the following actions as a minimum:

(a) *Employee involved in accident:*

1 Render all possible assistance to the injured;

2 Obtain names, addresses, and telephone numbers of witnesses;

3 Notify appropriate local authorities immediately of the accident;

4 Notify supervisor immediately regarding the accident;

5 Take action to prevent additional damage to, or loss of, Government or private property; and

6 Prepare Standard Form 91, Operator's Report of Motor-Vehicle Accident, (see Exhibit 1(16)10-3) and Optional Form 26, Data Bearing Upon Scope of Employment of Motor Vehicle Operator (see Exhibit 1(16)10-4), and forward to supervisor within 24 hours after the accident. Indicate on the SF-91 estimated dollar value of damages to all cars involved, whether employee's vehicle was Government-owned or personally-owned, and whether the vehicle was equipped with seat belts and if so, whether or not they were being used at the time of the accident. If they were being used, a brief statement on their effectiveness in preventing more serious injury should be included. (Note: Completion of Standard Form 91 and Optional Form 26 is required for *ALL* motor vehicle accidents, including those which occur while the employee is using his personally-owned car on official business. If the employee involved in the accident is incapacitated, it shall be the responsibility of any other Internal Revenue Service employee present to take the above actions.)

(b) *Supervisor of employee:*

1 Upon receipt of report of accident, obtain information necessary to determine type of investigation called for and whether any other action is required. (If information indicates necessity for formal investigation, see IRM 1(16)14.42(1)(b) for action to be taken);

2 See that all required forms, including SF-91A (Exhibit 1(16)10-5) or 92a (Exhibit 1(16)10-6), as appropriate, are completed promptly and forwarded through channels to the Chief, Administration Division, the Assistant Regional Commissioner (Administration), or to the Director, Facilities Management Division, Attention A:FM:N, if the accident involves a National Office employee. Standard Form 92 (Exhibit 1(16)10-7) is required whenever an employee is injured. It is forwarded, within 48 hours after the accident, through channels to the regional office, or to the Director, Facilities Management Division, Attention A:FM:N, if the accident involves a National Office employee. It is reviewed to determine whether proper corrective action was taken and whether additional accident prevention measures are needed. If it is a disabling injury, the SF-92 is forwarded to the Protective Programs Branch, A:FM:PR; otherwise, it is retained by the regional office or the National Office Facilities Branch for National Office employees. (Note: If the Standard Form 92 is for an employee of the Office of the Regional Counsel or Regional Inspector, it is forwarded to the Office of the Chief Counsel or the Assistant Commissioner (Inspection) for review of corrective action taken and completion. It should then be forwarded to the Facilities Management Division, A:FM:N, for review and statistical purposes.) Refer to Exhibit 1(16)10-2 for other required forms;

3 If the employee involved in the accident is injured and his return to duty status cannot be shown on the Form 92, Supervisor's Report of Accident, (see Exhibit 1(16)10-7), an estimate of the number of days the employee is expected to lose will be shown in Item 21 of the Standard Form 92;

4 Take all action possible to remove the cause of the accident or prevent a recurrence. Such actions may include:

a Recommendations to administrative officials for elimination of physical hazards responsible for the accident;

1(16)14.41 INFORMAL INVESTIGATIONS—Cont. (1)

b Disciplinary action against the employee involved, where justified, in accordance with established procedures;

c Transmission of copy of Standard Form 92 to GSA or other agency responsible for maintenance of the building with a request for necessary corrective action; and

5 See that the employee is aware that the Bureau of Employees' Compensation requires the submission of CA forms for purposes of employee compensation. Instructions on the preparation and submission of these forms is contained in IRM 1920. The submission of these forms to the Bureau of Employees' Compensation should be made promptly. Any reports submitted later than 60 days after the date of the accident will be considered late and a detailed report to the Chief, Protective Programs Branch, A:FM:PR, fully explaining the delay, will be required.

(c) *Chief, Administration Division:*

1 Review all accident reports received to ensure that:

a All possible steps have been taken at the district level to prevent similar accidents,

b All forms have been submitted and are complete (see Exhibit 1(16)10-2); and

2 Forward all accident reports and pertinent memorandums to the Assistant Regional Commissioner (Administration) after the required action has been completed.

(d) *Assistant Regional Commissioner (Administration):*

1 Review all accident reports to determine if additional action is necessary to remove hazards so as to prevent similar accidents and to ensure that all required administrative action has been accomplished;

2 Review accident statistics in the region to determine any significant accident patterns that would indicate need for preventive action and utilize this information in determining what areas of the safety program should be emphasized;

3 Ensure that all possible efforts are made to effect satisfactory settlements for damage to Internal Revenue Service property by non-Federal persons. When there is clear liability for property damage on the part of the non-Federal person and an apparent ability to pay, every effort should be made to collect the full amount of damages. However, where there is a question as to liability or ability to pay, the Assistant Regional Commissioner, with the concurrence of the Regional Counsel, is authorized to accept whatever settlement is considered satisfactory in the best interests of the Government without referral to the National Office.

a When fault or liability is admitted or circumstances indicate that the non-Federal person or his insurance company is agreeable to accepting liability, the employee involved should immediately request authority for repair or restoration at a local garage or shop acceptable to both parties with billing direct to the non-Federal person or his insurer. As soon as repair or restoration has been completed, a statement to that effect will be forwarded to the regional office. If a release from further liability for repair or restoration of the Government property involved is required, a request for preparation of such release will accompany the statement. A memorandum must accompany the Standard Form 91, Operator's Report of Motor-Vehicle Accident, and Optional Form 26. Data Bearing Upon Scope of Employment of Motor Vehicle Operator, stating either that the case was settled satisfactorily at the local level or the details of why appropriate arrangements for repair, restoration or settlement could not be made locally.

b In cases involving damage to Service property where the circumstances appear to warrant repair or restoration of such property at the expense of a non-Federal person and such person has not agreed informally to accept liability, the details of the circumstances involved should be reported in a memorandum which should be submitted with the accident investigation report through normal channels to the regional Facilities Management Branch for referral to Regional Counsel for processing. Regional Counsel will then prepare, over his signature, a formal demand for payment of damages, if appropriate. If the collection efforts are successful, a memorandum report should be forwarded by Regional Counsel to the Chief of the regional Facilities Management Branch together with any remittance received. If Regional Counsel's collection efforts are unsuccessful and the amount claimed by the United States does not exceed $5,000 exclusive of interest and costs, Regional Counsel will determine whether or not to request the United States Attorney to institute suit to recover for the damages to the Government property. If it is determined not to request the institution of suit, the Chief of the regional Facilities Management Branch should be so advised. If the institution of suit is requested, a copy of the letter to the United States Attorney will be forwarded to the Protective Programs Branch, Facilities Management Division, National Office, Attention A:FM:PR, together with the original of the accident investigation report. A copy of the letter to the United States Attorney will also be forwarded to the Chief of the regional Facilities Management Branch. In the event collection efforts are unsuccessful and the amount claimed by the United States exceeds $5,000 exclusive of interest and costs, four copies of the accident investigation report will be prepared and Regional Counsel's complete file, including a copy of the demand letter and any reply thereto, and three copies of the accident investigation report will be forwarded by Regional Counsel to the Chief Counsel, Attention CC:AT, for consideration of legal action to recover. A copy of the transmittal letter, together with the original of the accident investigation report, will be forwarded to the Protective Programs Branch, Facilities Management Division, National Office. A copy of the transmittal letter will also be forwarded to the Chief of the regional Facilities Management Branch; and

(1(16)14.41 INFORMAL INVESTIGATIONS— Cont. (2))

4 Ensure that all Standard Forms 92 on disabling injuries and all informal automobile accident investigation reports are submitted to the Chief, Protective Programs Branch, A:FM:PR, within 30 days after occurrence.

1(16)14.42 Formal Investigations

(1) In accidents involving formal investigations (see IRM 1(16)14.33), employees will take the following action:

(a) *Employee involved in accident:* Same as required for informal investigation (see IRM 1(16)14.41:(1)(a)). However, notify your supervisor promptly if the insurance company of the party at fault pays or agrees to pay all damages.

(b) *Supervisor of employee:*

1 As soon as assured that a formal investigation is required, telephone or wire the Regional Inspector, report the circumstances of the accident and request investigation be started immediately. If the employee is assigned to the National Office, the supervisor will contact the Director, Internal Security Division. If the supervisor later receives information as to settlement of damages or other information which may render the completion of the formal investigation unnecessary, he will promptly report such information to the appropriate Inspection official;

2 Prepare a brief memorandum outlining the facts of the accident and forward this, with the required forms, except the SF–92, if one is required (see Exhibit 1(16)10–2), properly completed, to the Regional Inspector or Director, Internal Security Division, if the employee is assigned to the National Office; and

3 Forward the SF–92 to the Chief, Administration Division, the Assistant Regional Commissioner (Administration), or the Director, Facilities Management Division, as applicable.

(c) *Chief, Administration Division:*

1 In any accident arising out of the activities of the Service, other than a motor vehicle accident, in which a non-Federal person sustains or alleges to sustain personal injury, see that SF–92a is prepared for each injured and made part of the formal investigation;

2 Review SF–92 for completeness, and appropriateness of corrective action;

3 Take all possible steps to prevent similar accidents; and

4 Forward the SF–92 to the Assistant Regional Commissioner (Administration) at once.

(d) *Inspection:* Upon receipt of information indicating a necessity for a formal investigation of an accident, the Director, Internal Security Division, or the Regional Inspector, as applicable, shall:

1 Notify the Chief, Administration Division, the Assistant Regional Commissioner (Administration), or the Director, Facilities Management Division, A:FM:N, as appropriate, that the accident has occurred and that Inspection is instituting an investigation;

2 Complete the investigation as quickly as possible and set forth the findings on Form 2023, including information prepared in the format as shown in Exhibit 1(16)-10-8, using SF–91, Statement of Witness, (see Exhibit 1(16)10-9), as required;

3 Forward original and two copies of the report to the Assistant Regional Commissioner (Administration) or, if National Office personnel are involved, to the Director, Facilities Management Division, Attention A:FM:N;

4 Where information is reported or developed during the investigation that satisfactory settlement of damages has been accomplished or other circumstances become known which may eliminate the need for completing the investigation, such information will be discussed with the appropriate Administration official to arrive at a decision as to discontinuance or completion of the investigation. In doubtful property-damage-only cases and in all personal injury cases, the Administration official should seek the concurrence of the Regional Counsel or Chief Counsel, as appropriate; and

5 If no investigation is accomplished and no investigative report is written, the accident reporting forms received will be forwarded as provided in 3 above.

(e) *Assistant Regional Commissioner (Administration):*

1 Complete all applicable action required in IRM 1(16)14.41:(1)(d);

2 Give thorough review to all formal investigation reports received from the Regional Inspector for indications of possible excessive claims;

3 Request the Regional Counsel to review the report of investigation if:

a Claim made appears to be excessive,

b There is a question as to the extent of injury to a non-Federal person or damage to non-Federal Property,

c Such review appears necessary to protect the interests of the Government;

4 Upon request of the Regional Counsel, make arrangements for physical examinations of non-Federal persons at the nearest Public Health hospital or clinic or by a private physician. Such examination will be performed *only* upon the authority of the Regional Counsel, who must also initial the voucher for payment for such examination. To make these arrangements a letter should be addressed to the head of the hospital or clinic, including the name and title of the Internal Revenue Service employee involved in the accident and name and address of the office where he is employed. Include a carbon copy of the letter with the original and request the Public Health facility to attach the carbon copy of your letter to the reimbursement voucher when forwarded for payment. An approved private physician may be used if a monetary saving to the Government is indicated. (See pamphlet "Medical Facilities Available to Employees of the U. S. Government Injured in the Performance of Duty Under

(1(16)14.42 FORMAL INVESTIGATIONS—Cont.)

the Federal Employees' Compensation Act of September 7 [illegible]16, as amended"); and

5 Forward original of the investigative report, with exhibits, to the Chief, Protective Programs Branch, A:FM:PR. One copy of the report may be forwarded to the activity concerned, if deemed appropriate. In most instances this will be the Chief, Administration Division, district office. Board of Survey action may be required in connection with damage to motor vehicles or other property or Board of Inquiry action in connection with a death or serious injury. In such a case, the regional office copy may be used when appropriate.

(f) *Protective Programs Branch:*

1 Review all accident reports forwarded from field offices and those pertaining to National Office personnel or property, to ensure that all required and appropriate measures have been taken in relation to the accident prevention program;

2 Where necessary, arrange for review of accident reports by the Office of the Chief Counsel;

3 Maintain files of all types of accident reports received, compile accident statistics and prepare reports required under the Treasury Department Safety Program;

4 Send a copy of the approved recommendations of the Chief Counsel on claims to the region concerned. This is an information copy and may or may not be accompanied · suggestions as to recommended action; and

5 Keep records of all claims and suits against the Internal Revenue Service under the Federal Tort Claims Act and the Military Personnel and Civilian Employees' Claims Act of 1964.

1(16)14.5 CLAIMS

1(16)14.51 Tort

(1) The Federal Tort Claims Act authorizes the head of each agency to settle or reject claims against the Government for $2,500 or less, and permits individuals to file suits against the Government for property loss or damage, personal injury or death caused by the negligence or wrongful act or omission of a Government employee acting within the scope of his employment. The Commissioner has delegated settlement authority to the Assistant Commissioner (Administration), the Director, Facilities Management Division, the Chief, Protective Programs Branch, and the Safety Management Officer, A:FM:PR.

(2) Claims should be filed with the Commissioner of Internal Revenue, Washington, D. C. 20224, and should be made on Standard Form 95, Claim for Damage or Injury (see Exhibit 1(16)10-10). When a claim is presented at a field office, it should be forwarded immediately through the Assistant Regional Commissioner (Administration), to the Chief, Protective Programs Branch, A:FM:PR.

(3) Upon receipt of a claim the Protective Programs Branch will attach all pertinent data, including the investigative report and forward the case to the Office of the Chief Counsel, which will prepare a memorandum to the Safety Management Officer, A:FM:PR, containing a recommendation on the disposition of the claim.

(4) All claims should be promptly date stamped by the office first receiving them.

(5) If the Chief Counsel's recommendation is for approval, he will also prepare a letter for the signature of the Safety Management Officer, notifying the claimant that his claim has been approved. He will also complete three copies of Standard Form 1145, Voucher for Payment Under Federal Tort Claims Act. The memorandum, letter and voucher forms will be attached to the investigative file and forwarded to the Chief, Protective Programs Branch, A:FM:PR, for further action.

(6) If the recommendation is for disapproval, a letter to the claimant, briefly outlining the reasons, shall be prepared by the Chief Counsel for the signature of the Safety Management Officer, A:FM:PR, and will be forwarded to that division with the file and the recommendation.

(7) If the Safety Management Officer, A:FM:PR, concurs in the recommendation of the Chief Counsel, he will sign the memorandum as evidence of his agreement and will sign the letter to the claimant. If the recommendation is for approval, the original of the SF-1145 will be forwarded with the letter to the claimant for his signature.

(8) Upon return of the signed Standard Form 1145, the Protective Programs Branch will forward it, with two copies and a copy of the approved recommendation, to the Fiscal Management Division for payment. When the claim is paid the Fiscal Management Division will return one copy of the Standard Form 1145 to the Protective Programs Branch showing date of payment.

1(16)14.52 Military Personnel and Civilian Employees' Claims Act of 1964

(1) Public Law 88-558, as amended, Military Personnel and Civilian Employees' Claims Act of 1964, authorizes the head of each agency to settle claims against the Government for $6,500 or less ($10,000 or less for Coast Guard) and permits employees to file claims against the Government for damage to, or loss of, personal property incident to their service where possession of such property is determined to be reasonable, useful, or proper under the circumstances. The Commissioner has delegated settlement authority to the Assistant Commissioner (Administration), the Director, Facilities Management Division, the Chief, Protective Programs Branch, and the Safety Management Officer, A:FM:PR.

(2) Treasury Department Regulations, Military Personnel and Civilian Employees' Claims Act of 1964, dated October 20, 1965, provides detailed information as to the types of claims covered by this Act.

(3) Claims should be made on Treasury Form 3079 (see Exhibit 1(16)10-11) according to instructions on the reverse side of the form and forwarded through channels to the Protective Programs Branch, A:FM:PR.

(1(16)14.52 MILITARY PERSONNEL AND CIVILIAN EMPLOYEES' CLAIMS ACT OF 1964—Cont.)

(4) Claims should be promptly date stamped by each office receiving them.

(5) Upon receipt of a claim the Protective Programs Branch will attach all pertinent data and forward the claim to the office of the Chief Counsel which will prepare a memorandum to the Safety Management Officer, A:FM:-PR, recommending disposition of the claim.

(6) Chief Counsel will also prepare a letter to the claimant approving the claim or briefly outlining the reasons for disapproval, for the signature of the Safety Management Officer, and return the file, with recommendation and letter, to the Protective Programs Branch, A:FM:PR.

(7) If the Safety Management Officer concurs in the recommendation of Chief Counsel, he will sign the memorandum and the letter to the claimant as evidence of his agreement.

(8) If the claim is approved, the Protective Programs Branch will forward the original of the letter to the claimant; one copy of the letter and recommendation to the region, or National Office Facilities Branch; prepare Standard Form 1166, Voucher and Schedule of Payments, and forward the voucher with one copy of the memorandum and the letter to the Fiscal Management Division for payment. When the claim is paid, the Fiscal Management Division will return one copy of the Standard Form 1166 to the Protective Programs Branch showing date of payment.

(9) If the claim is disapproved, the Protective Programs Branch will send the original of the letter to the claimant and one copy of the letter and memorandum to the region or National Office Facilities Branch for National Office employees.

1(16)14.53 Encouraging claims

Under no circumstances shall Service employees encourage or solicit private parties to present a claim against the Government. However, if private parties state verbally or otherwise indicate that they expect the Government to make restitution for damage, loss, or injury, or that they intend to file claim against the Government, it is not a violation of this prohibition to call attention to the Federal Tort Claims Act, and state that additional information and forms may be obtained from the regions or National Office Facilities Branch for acts involving National Office personnel.

1(16)14.6 SUITS

(1) When a claimant files suit against the United States alleging negligence on the part of an Internal Revenue Service employee, the Department of Justice will request all documents and information necessary for the preparation of a defense. This information will be furnished to the Department of Justice by the Chief Counsel.

(2) The institution of suits on behalf of the Service by the United States Attorney will be requested by Regional Counsel if the amount claimed by the United States does not exceed $5,000 exclusive of interest and costs. If, however, the amount claimed by the United States exceeds $5,000 exclusive of interest and costs, the institution of suits on behalf of the Service by the Department of Justice will be requested by the Chief Counsel.

(3) The Federal Tort Claims Act, as amended by Public Law 87-258, provides for the defense of suits against Federal employees arising out of the operation of motor vehicles in the scope of their employment in the case of accidents occurring on or after March 21, 1962. This new law makes the remedy provided by the Federal Tort Claims Act the sole remedy for property damage, personal injury, or death resulting from the operation of a motor vehicle by a Government employee while acting within the scope of his office or employment. The new law further provides that, upon a certification by the Attorney General that the defendant employee was acting within the scope of his employment at the time of the incident out of which the suit arose, any such civil action or proceeding commenced in a State court shall be removed without bond at any time before trial by the Attorney General to the district court of the United States for the district and division embracing the place wherein it is pending and the proceedings deemed a tort action brought against the United States under the provisions of the Federal Tort Claims Act. By Department of Justice Order No. 254-61, the authority to make the certification provided for in this law has been delegated by the Attorney General to United States Attorneys with the proviso that such a certification may be withdrawn if a further evaluation of the relevant facts or the consideration of new or additional evidence calls for such action. Order No. 254-61 further provides that the making, withholding, or withdrawing of certifications, and the removal and defense of, or the refusal to remove and defend, such civil actions or proceedings by the United States Attorneys shall be subject to the instructions and supervision of the Assistant Attorney General in charge of the Civil Division of the Department of Justice.

(4) Any Internal Revenue Service employee against whom a civil action or proceeding is brought for damage to property, or for personal injury or death, on account of the employee's operation of a motor vehicle in the scope of his office or employment with the Internal Revenue Service (or his personal representative, if the action is brought against his estate) shall *immediately* advise the Regional Counsel, if a field employee, or the Chief Counsel, if a National Office employee, of the details by telephone or

(1(16)14.6 SUITS--Cont.)

telegraph. In addition, he shall *immediately* forward all process and pleadings served upon him, or an attested true copy thereof, to the Regional Counsel or, in the case of National Office employees, to the Chief Counsel, Attention CC:AT. The employee concerned shall also promptly submit to his immediate supervisor, in triplicate, a signed report describing the duties he was performing at the time the accident occurred, the place where the trip originated, his intended destination, and any other information bearing on the question of whether he was acting within the scope of his office or employment at the time of the incident out of which the suit arose, unless such information was previously reported to his immediate supervisor on the Optional Form 26 prepared at the time of the accident. If the employee was driving a privately-owned vehicle at the time of the accident which gave rise to the suit, he shall at the same time also furnish his supervisor, in triplicate, a copy of any automobile liability insurance policy held by him. The employee sued will thereafter render any assistance and give any additional information that the United States Attorney may desire.

(5) The employee's immediate supervisor shall prepare a signed report describing the nature of the driver's duties, the instructions—if any—given him, his authorized destination, the conveyance authorized, whether he had departed from the route authorized or disobeyed any instructions given him, whether he was engaged in the furtherance of his own personal interest in any way, and any other relevant data, unless such information was previously reported on the Optional Form 26 prepared at the time of the accident. The employee's and supervisor's reports involving field employees and employee's automobile liability insurance policy, if any, shall be promptly forwarded, in triplicate, to the Regional Counsel. Reports involving National Office employees will be forwarded to the Chief Counsel, Attention CC:AT.

(6) The Regional Counsel shall promptly furnish the United States Attorney for the judicial district embracing the place wherein the action or proceeding is brought with information concerning the commencement of such action or proceeding, all process and pleadings, or an attested true copy, the reports of the employee and supervisor, and a copy of the employee's automobile liability insurance policy, if any. The Chief Counsel shall furnish the same information with regard to suits involving National Office employees.

(7) The Regional Counsel shall forward, in duplicate, to the Chief Counsel, Attention CC:AT, copies of the same information and all documents furnished the United States Attorneys. The Chief Counsel will in turn forward one copy to the Chief of the Torts Section, Civil Division, Department of Justice, if the amount sought exceeds $5,000 or if the Department of Justice otherwise requests it.

(8) The Regional Counsel or the Chief Counsel will keep the Assistant Regional Commissioner (Administration), or the Director, Facilities Management Division, as appropriate, or their designees, currently informed of the status of all suits which are within the purview of the Federal Tort Claims Act.

(9) A copy of IRS Document No. 5418, "Lawsuits Affecting Internal Revenue Service Drivers," shall be furnished to each employee who has occasion to drive a vehicle on official business.

(10) Should a suit (not arising out of the operation of a motor vehicle) be filed against an employee of the Internal Revenue Service, or if an employee is charged with violation of criminal laws, as a result of the performance of his official duties, it should be reported immediately to the Regional Counsel (Chief Counsel in the case of National Office employees). In the case of civil suits, the employee should also furnish a copy of any insurance policies that may cover his liability. If the employee desires legal representation by the United States Government, he should so advise the Regional Counsel or the Chief Counsel, as the case may be. Prompt notification is necessary since it may be found desirable to remove the case to a United States District Court which, in a civil action, must be effected within 30 days from the date the complaint was served on the employee, and in a criminal case the removal must be effected before trial. (Under ordinary circumstances, a request for the United States Attorney to afford legal counsel is made through the National Office. When time does not permit, the United States Attorney will, upon request of the local official in charge, afford legal counsel to Government employees who are sued civilly, or charged with violation of criminal laws, as a result of the performance of their official duties. Should such a request for legal counsel be made locally to the United States Attorney, a report thereof should be made as soon as possible through channels to the Director, Facilities Management Division, by the local official who made the request.)

(11) Reporting Traffic Citations: As a plea of guilty in traffic court may be introduced as evidence in a civil action, it is imperative that all Service employees obtain legal counsel if they are cited for a traffic violation while in performance of official business resulting in an accident, before entering such a plea in court. It is the responsibility of the individual driver who is cited for a traffic violation resulting in an accident, to report such incident to his supervisor immediately. The supervisor will be responsible for reporting the incident to the legal counsel of his office. IN NO CASE SHOULD A SERVICE EMPLOYEE PLEAD GUILTY TO A TRAFFIC VIOLATION CHARGE RESULTING IN AN ACCIDENT WITHOUT ADVICE AND COUNSEL OF A REPRESENTATIVE OF THE CHIEF COUNSEL'S OR REGIONAL COUNSEL'S OFFICE.

1(16)15 Safety Awards

1(16)15.1 GENERAL

(1) There are four types of safety awards issued to major organizational components of the Service for outstanding safety performance:

(a) The Commissioner's Safety Award, in the form of a certificate signed by the Commissioner, is presented to designated organizational components to recognize outstanding performance over a sustained period of time.

(b) The Internal Revenue Service Annual Regional Safety Award, in the form of a plaque, is presented each year to the region with the lowest disabling injury frequency rate during the preceding year.

(c) The Internal Revenue Service Annual Service Center Safety Award, in the form of a plaque, is presented each year to the service center with the lowest disabling injury frequency rate during the preceding year.

(d) The National Office Annual Safety Award, in the form of a plaque, is presented each year to the major functional area in the National Office with the lowest disabling injury frequency rate during the preceding year.

1(16)15.2 ELIGIBILITY

1(16)15.21 Commissioner's Safety Award

(1) Each regional office, each district office, each service center, the National Computer Center, the Data Center, and the National Office will be eligible to receive this award for the completion of 1,000,000 man-hours of work without a disabling injury or one year without a disabling injury, whichever occurs first.

(2) Since regional offices are directly responsible for field activities of the Alcohol and Tobacco Tax and Appellate Divisions, disabling injuries involving employees of those divisions, regardless of the employees' location at the time, will be charged to the regional office.

(3) Disabling injuries involving employees of the offices of the Regional Counsel and the Regional Inspector will be charged to the office of the Chief Counsel and the Assistant Commissioner (Inspection), respectively.

1(16)15.22 Internal Revenue Service Annual Regional Safety Award

(1) Eligibility for this award is limited to entire regions, including injury experience of the service centers. The region with the lowest disabling injury frequency rate (number of disabling injuries per million hours worked) during the calendar year will be presented the plaque in the spring of the following year.

(2) The region which wins this plaque may retain it for one year. At the end of that year they will receive a small plaque as evidence of having won the award.

(3) A region winning the Award three times during a 10-year period will gain permanent possession of the plaque.

1(16)15.23 Internal Revenue Service Annual Service Center Safety Award

(1) The service center with the lowest disabling injury frequency rate during the calendar year will be presented this plaque in the spring of the following year.

(2) The winning service center may retain the plaque for one year. At the end of that year, they will receive a small plaque as evidence of having won the Award.

(3) A service center winning the Award three times during a 10-year period will gain permanent possession of the plaque.

1(16)15.24 National Office Annual Safety Award

(1) An awards program has been established among the major functional areas in the National Office. They are the functional areas of each Assistant Commissioner and the Chief Counsel. The injury experience of the employees of the offices of the Regional Counsel and the Regional Inspector will be included in the appropriate functional area for this purpose.

(2) The functional area with the lowest disabling injury frequency rate during the calendar year will be presented a plaque in the spring of the following year. The plaque may be retained for one year. In the event of a tie, the winning functional areas will each retain the plaque for an appropriate portion of the following twelve months.

(3) A functional area winning the Award three times during a 10-year period will gain permanent possession of the plaque.

1(16)15.3 REPORTS AND STATISTICS

(1) Each regional office and the National Office Facilities Branch will, when appropriate, submit a memorandum to the Chief, Protective Programs Branch, National Office, recommending the issuance of the Commissioner's Safety Award to the eligible component. If the award covers twelve months without a disabling injury, the date of injury and name of the employee who was injured on the day before and, if any, after the period of eligibility will be included.

(2) If the award covers one million man-hours of work, or more, without a disabling injury, the figures and method used for computation and dates involved will be included. The following simple method should be used in this computation:

(1(16)15.3 REPORTS AND STATISTICS—Cont.)

Method of Computation

(Standard man-hours per year for each employee = 2080)

Formula: Days or Months × Hours × Employees[1] on rolls = Man-hours

Periods of 1 month or more	Number of Months	×	173 per mo.[2]	×	Number = Total
Periods less than 1 month	Number of working days	×	8 per day	×	Number = Total

[1] On rolls at the end of month or nearest the end of month, as shown in the monthly Personnel Report.

[2] For December use 177 hours.

Example:

A district with 950 employees each month for the period January through July with no disabling injuries until July 15.

January 1 — June 30	6 × 173 × 950 =	986,100
July 1 — July 15	11 × 8 × 950 =	83,600
	Total	1,069,700

(3) The National Office Facilities Branch will maintain statistics and determine eligibility for the National Office Annual Safety Award.

(4) The Protective Programs Branch, National Office, will maintain statistics to confirm eligibility for the Awards and for other purposes, and will prepare and forward Awards to eligible components upon request.

1(16)16 Board of Inquiry

1(16)16.1 GENERAL

(1) Boards of Inquiry are set up to determine the cause of all work-connected accidents or occupational diseases which result in death or serious injury to Service employees or to non-Federal persons as a result of Service activities, and recommend corrective action to prevent a recurrence.

(2) A serious injury is, for this purpose, one which results in a loss of time from work of 30 or more calendar days. The Board will also consider suicides and heart attacks only if alleged to have occurred as a result of overwork, job-pressures, or a similar work-connected cause. It is not the intent that every suicide or heart attack case be a matter requiring Board attention. Some disabling injuries resulting from falls, improper lifting, or other causes may not be immediately discernible as a serious injury. However, if it later appears likely that, as a result of the initial injury, there will be a loss of time from work of 30 or more calendar days, or if death results, the report required in IRM 1(16)16.4 will be submitted.

1(16)16.2 BOARD OBJECTIVES

(1) The Board has the following two major objectives:

(a) Determine from a review of the report of investigation or by other means, the circumstances and cause of the accident which resulted in the serious injury or death; and

(b) Make recommendations for corrective action to prevent a recurrence of similar accidents.

1(16)16.3 NATIONAL OFFICE

The National Office Board of Inquiry will follow field procedures except that substitutions in IRM 1(16)16.4 through 1(16)16.62 will be made as follows:

Director, Facilities Management Division, for
Assistant Regional Commissioner (Administration)

National Office Safety Officer for
Regional Safety Officer

Assistant Commissioner for
Assistant Regional Commissioner

1(16)16.4 INITIAL REPORTING OF SERIOUS INJURIES OR DEATHS

(1) It remains the responsibility of each supervisor to see that accident reports are promptly prepared and submitted. An initial report or notice of a work-connected death or serious injury of a Service employee or non-Federal person will be submitted by TWX or telephone to the Assistant Regional Commissioner (Administration) within 48 hours after the accident. The information received by the regional office will be forwarded immediately via TWX or telephone to the Chief, Protective Programs Branch (A:FM:PR). The initial report should cover as a minimum the following information:

(a) Name of deceased or injured

(b) Federal or non-Federal person

(c) Job title

(1(16)16.4 INITIAL REPORTING OF SERIOUS INJURIES OR DEATH—Cont.)

(d) Circumstances and cause

(e) Location and time

(2) The Assistant Regional Commissioner (Administration) should refer this information to the Regional Safety Officer who will carefully review it and determine whether the accident meets the criteria for conveuing a Board of Inquiry. He will then make the appropriate recommendation to the Assistant Regional Commissioner (Administration).

(3) The initial notice of a work-connected death or serious injury does not eliminate the reporting requirements of IRM 1(16)14.

1(16)16.5 CALLING OF BOARD

(1) *Required*—The Assistant Regional Commissioner (Administration) shall call a Board of Inquiry for all cases of work-connected death or serious injury of Servive personnel, or death to non-Service personnel as a result of Service activities.

(2) *Discretionary*—The Assistant Regional Commissioner (Administration) may call a Board of Inquiry whenever he feels circumstances warrant such action.

1(16)16.6 BOARD MEMBERSHIP

1(16)16.61 Chairman

The Assistant Regional Commissioner (Administration) or his appointed representative will be the permanent chairman of Regional Boards of Inquiry.

1(16)16.62 Other Members

(1) In addition to the Chairman, each Board shall be composed of the following membership:

(a) Assistant Regional Commissioner, or his appointed representative, of the activity of the employee involved;

(b) Regional Safety Officer;

(c) Personnel Officer or his appointed representative (Technical Advisor-Non-Voting); and

(d) The Service Safety Management Officer may serve as an advisory (non-voting) member at the invitation of the Regional Commissioner or at the discretion of the Chief, Protective Programs Branch, A:FM:PR.

(2) Appointed representatives may include district or service center personnel.

(3) It may be desirable to include a representative of the General Services Administration or the Department of Labor as a non-voting member of those Boards considering cases in which these agencies have an interest or could render assistance.

1(16)16.63 Board Chairman Responsibilities

(1) The Chairman shall be responsible for:

(a) Ensuring that the report of investigation and other information are circulated to all Board members prior to convening the Board;

(b) Calling the Board of Inquiry promptly but not later than 30 days after the death, serious injury, or occupational disease, or as soon as possible after any formal investigation is available;

(c) Notifying in writing all Board members and witnesses of the time, date, place, and case to be heard by the Board;

(d) Sending a copy of the notification to the Assistant Commissioner (Administration), A:FM:PR, in sufficient time to permit representation by the Service Safety Management Officer, if necessary;

(e) Ensuring that the proceedings are not open to the public and that employee supervisors and non-Board members are not present as observers during the hearing; and

(f) Ensuring that a report, summary, and recommendations are prepared and submitted as prescribed in IRM 1(16)16.7.

(2) The Chairman will assume the responsibility for protecting the interests of a deceased employee, when matters prejudicial to the character, standing, or efficiency of the employee arise by requiring further investigation, if necessary, to establish the facts.

1(16)16.64 Employee Rights

When matters prejudicial to the character, standing, or efficiency of any Service personnel arise during the course of a Board of Inquiry, the Board shall make known to the employee's responsible line official the precise nature of such matters. Line officials shall then take steps to apprise the employee of his right to be heard and to submit evidence to refute the allegations.

1(16)16.7 REPORT OF BOARD

(1) No index is necessary for the ordinary short report. However, in a long report consisting of many exhibits an index will be prepared giving a list of witnesses, page number of pertinent statements given or made to the Board, brief description of each exhibit and page number where presented.

(2) Actions of the Board, including the determination and recommendations required, shall be decided by majority vote of the Board members. Any member of the Board may file a separate report in order to express reasons for determinations which differ from those of a majority of the Board.

(3) Board of Inquiry reports, with recommendations and exhibits, will be prepared in sufficient copies to meet the following minimum distribution requirements:

(a) Regional Board—The original for the Regional Commissioner to be filed with Board of Inquiry records; two copies for the Chief, Protective Programs Branch, A:FM:PR; and one copy for the Assistant Regional Commissioner of the activity of the employee involved.

(b) National Office Board—The original for the Assistant Commissioner (Administration) to be filed with Board of Inquiry records; two copies for the Chief, Protective Programs Branch, A:FM:PR; and one copy for the Assistant Commissioner of the activity of the employee involved.

(4) The necessary follow-up on recommendations made by the Board shall be taken by the Regional or National Office Safety Officers to ensure appropriate recommendations are put into practice. The Service Safety Management Officer will coordinate implementation of those recommendations which are of Service-wide significance.

EXHIBIT 1(16)10-1

Report Symbol No-A: FM-22

REPORT OF PHYSICAL HAZARDS IN OFFICES

DATE REPORT SUBMITTED
March 23, 1966

This form was developed for use by persons in supervisory capacity for determining the physical conditions in their work area which inherently, or through application or use, present accident hazards to personnel.

TO:
Facilities Management Division
A:FM:PR

FROM: (Name, Section, Room No. Telephone No.)
John Jones, Safety Inspector
Room 3118, Ext. 2700

PART I - IDENTIFICATION DATA (Area Covered by Survey)

(Check which)
☒ NATIONAL OFFICE
☐ REGIONAL OFFICE (Specify)

IF NATIONAL OFFICE (Specify Division): Fiscal Management Division
IF REGIONAL OFFICE (Specify Office in Region):

BUILDING: Internal Revenue
ROOM NO.: 3105-3127
3102-3130
CITY: Washington, D. C. 20224

PART II - INSPECTION DATA

INSTRUCTIONS

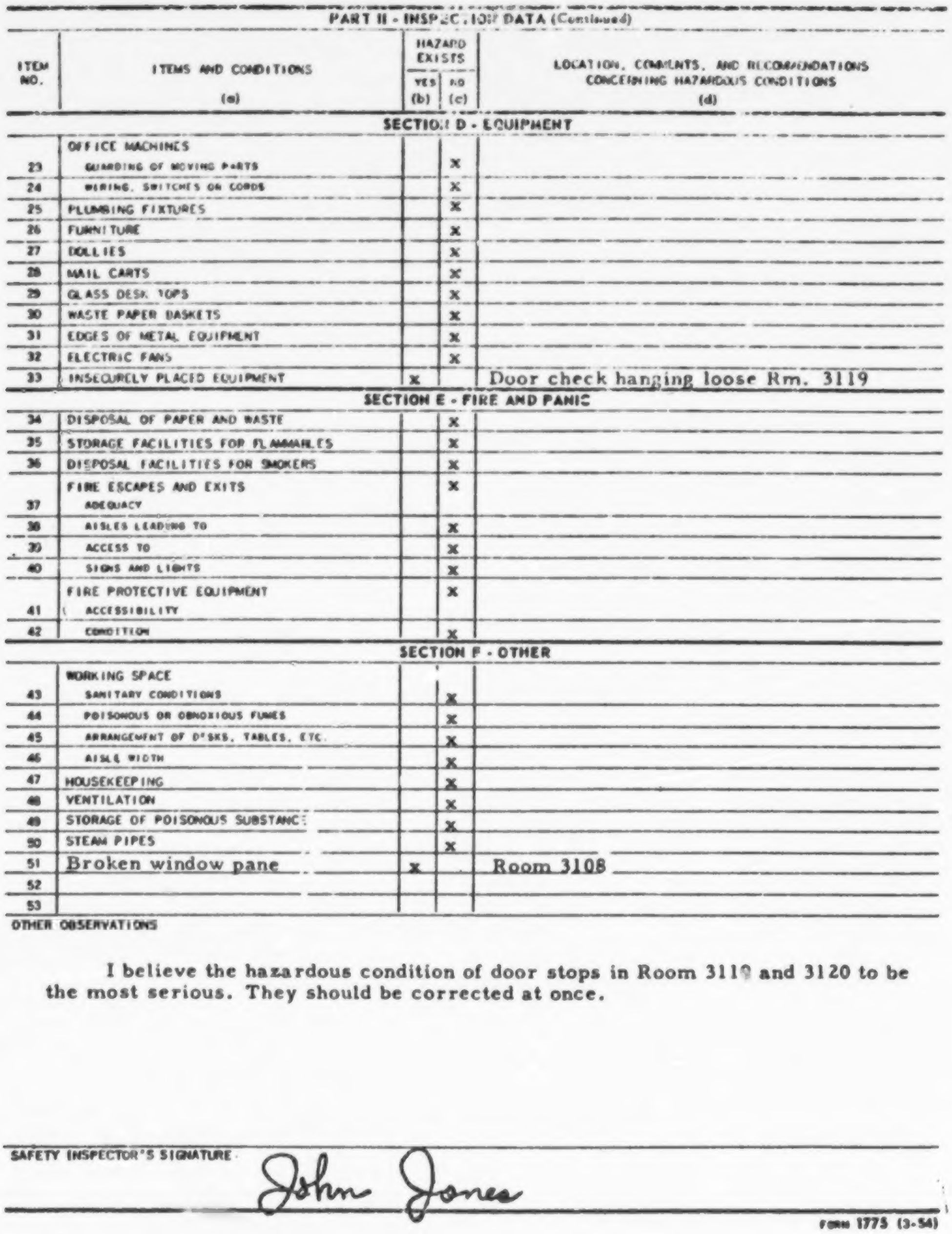
Listed in Column (a) below are "Items and Conditions" that may in some instances endanger the physical well-being of employees. A few examples will illustrate. Protruding nails or screws may cause tripping hazards or puncture wounds; improper illumination such as shadows, glare, lights out, etc., may cause tripping and falling hazards; improperly stacked materials may fall and injure someone; improperly located extension cords and telephone wires may cause falls from tripping; open file or desk drawers may cause someone to bark shins or fall; if glass-top desks are permitted, cracked, checked or broken glass may cause serious lacerations; loose or excessively vibrating fans may fall and injure persons nearby; blocked aisles will hamper emergency exits; poorly arranged desks may cause undue crowding and hamper egress. For each item or condition that is applicable to the working area, indicate whether or not a hazard exists by checking "Yes" Column (b) or "No" Column (c). For each existing hazard (Items and Conditions checked "Yes"), pertinent "Comments and Recommendations" for remedial action will be made in Column (d). Items and conditions peculiar to the working area, that are not listed in Column (a), should be added in the space provided in Section F.

ITEM NO.	ITEMS AND CONDITIONS (a)	HAZARD EXISTS		LOCATION, COMMENTS, AND RECOMMENDATIONS CONCERNING HAZARDOUS CONDITIONS (d)
		YES (b)	NO (c)	
	SECTION A - TRIPPING, SLIPPING AND FALLING			
	FLOORS AND STAIRWAYS			
1	WATER, OIL, SOAP, ETC.		x	
2	HIGHLY POLISHED SURFACES		x	
3	TORN OR LOOSE COVERING	x		Torn rugs Room 3118 need repair
4	ROUGH OR SPLINTERED SURFACES		x	
5	PROTRUDING NAILS, SCREWS, ETC.		x	
6	HANDRAILS		x	
7	ILLUMINATION		x	
8	TREADS		x	
9	PROJECTING OUTLETS		x	
10	EXTENSION CORDS	x		Provide outlet in Rm. 3111 to eliminate
11	LADDER		x	cord across aisle.
12	WASTEBASKETS		x	
	SECTION B - TIPPING AND FALLING OBJECTS			
13	FILE CABINETS		x	
14	LOCKER SHELVES		x	
15	CEILING AND LIGHTING FIXTURES		x	
16	PLASTER	x		Cracked and falling in Rm. 3123
17	STACKED MATERIALS		x	
	SECTION C - COLLISIONS AND OBSTRUCTIONS			
18	AISLE CONDITIONS		x	
19	VALVES AND PIPES		x	
20	PENCIL SHARPENERS		x	
21	DESK AND FILE CABINET DRAWERS		x	
22	Door Stop	x		Door stop was removed Rm. 3120 and never replaced. (OVER)

U. S. TREASURY DEPARTMENT - INTERNAL REVENUE SERVICE

Form 1775 (3-54)

EXHIBIT 1(16)10-1—*Cont.*



PART II - INSPECTION DATA (Continued)

ITEM NO.	ITEMS AND CONDITIONS (a)	HAZARD EXISTS YES (b)	HAZARD EXISTS NO (c)	LOCATION, COMMENTS, AND RECOMMENDATIONS CONCERNING HAZARDOUS CONDITIONS (d)
	SECTION D - EQUIPMENT			
	OFFICE MACHINES			
23	GUARDING OF MOVING PARTS		x	
24	WIRING, SWITCHES OR CORDS		x	
25	PLUMBING FIXTURES		x	
26	FURNITURE		x	
27	DOLLIES		x	
28	MAIL CARTS		x	
29	GLASS DESK TOPS		x	
30	WASTE PAPER BASKETS		x	
31	EDGES OF METAL EQUIPMENT		x	
32	ELECTRIC FANS		x	
33	INSECURELY PLACED EQUIPMENT	x		Door check hanging loose Rm. 3119
	SECTION E - FIRE AND PANIC			
34	DISPOSAL OF PAPER AND WASTE		x	
35	STORAGE FACILITIES FOR FLAMMABLES		x	
36	DISPOSAL FACILITIES FOR SMOKERS		x	
	FIRE ESCAPES AND EXITS		x	
37	ADEQUACY			
38	AISLES LEADING TO		x	
39	ACCESS TO		x	
40	SIGNS AND LIGHTS		x	
	FIRE PROTECTIVE EQUIPMENT		x	
41	ACCESSIBILITY			
42	CONDITION		x	
	SECTION F - OTHER			
	WORKING SPACE			
43	SANITARY CONDITIONS		x	
44	POISONOUS OR OBNOXIOUS FUMES		x	
45	ARRANGEMENT OF DESKS, TABLES, ETC.		x	
46	AISLE WIDTH		x	
47	HOUSEKEEPING		x	
48	VENTILATION		x	
49	STORAGE OF POISONOUS SUBSTANCES		x	
50	STEAM PIPES		x	
51	Broken window pane	x		Room 3108
52				
53				

OTHER OBSERVATIONS

I believe the hazardous condition of door stops in Room 3119 and 3120 to be the most serious. They should be corrected at once.

SAFETY INSPECTOR'S SIGNATURE John Jones

FORM 1775 (3-54)

EXHIBIT 1(16)10–2

ACCIDENT REPORTING FORMS AND INVESTIGATIONS

Circumstances	Motor vehicle accident	Other than motor vehicle accident	Federal Employees Compensation Act	Investigation required	
				Informal	Formal
Disabling or non-disabling injury or death to Service employee on duty.	SF-91[1] SF-91A[2] SF-92[3] OF-26[1]	SF-92[3]	See IRM 1920, Employees' Compensation for Injuries	All cases[7]	
Any injury or alleged injury to to non-Federal person.	SF-91[1] OF-26[1]	SF-92a[4]			All cases
Property damage only:					
1. To Service property	SF-91[1] SF-91A[2] OF-26[1]			All cases except→	When damage is $250 or more and there is a reasonable possibility of a claim against a non-Federal person(s).
		SF-92[3]		If damage is more than $25 but less than $250 and there is a reasonable possibility of a claim against a non-Federal person(s).[5]	If damage is $250 or more and there is a reasonable possibility of a claim against a non-Federal person(s).[5]
(a) Fire		SF-92[3]		All cases	
2. To non-Federal property	SF-91[1] SF-91A[2] OF-26[1]	SF-92a[4]		If damage is less than $250	If damage is $250 or more[6]

---

[1] Form to be completed by employee involved.

[2] Form to be completed by person making investigation and immediate supervisor of employee. It should also be reviewed and signed or initialed by the Regional Safety Officer. If no investigating officer is appointed, Item [illegible] on the form should be marked "Not Applicable." This form is not required if formal investigation is conducted.

[3] Form to be completed by supervisor.

[4] Form to be completed by appropriate official and made part of formal investigation when appropriate.

[5] If property damage caused by Service employee, report should be made in accordance with provisions of IRM 1(14)40 and Board of Survey will recommend to Survey Officer the fixing of responsibility.

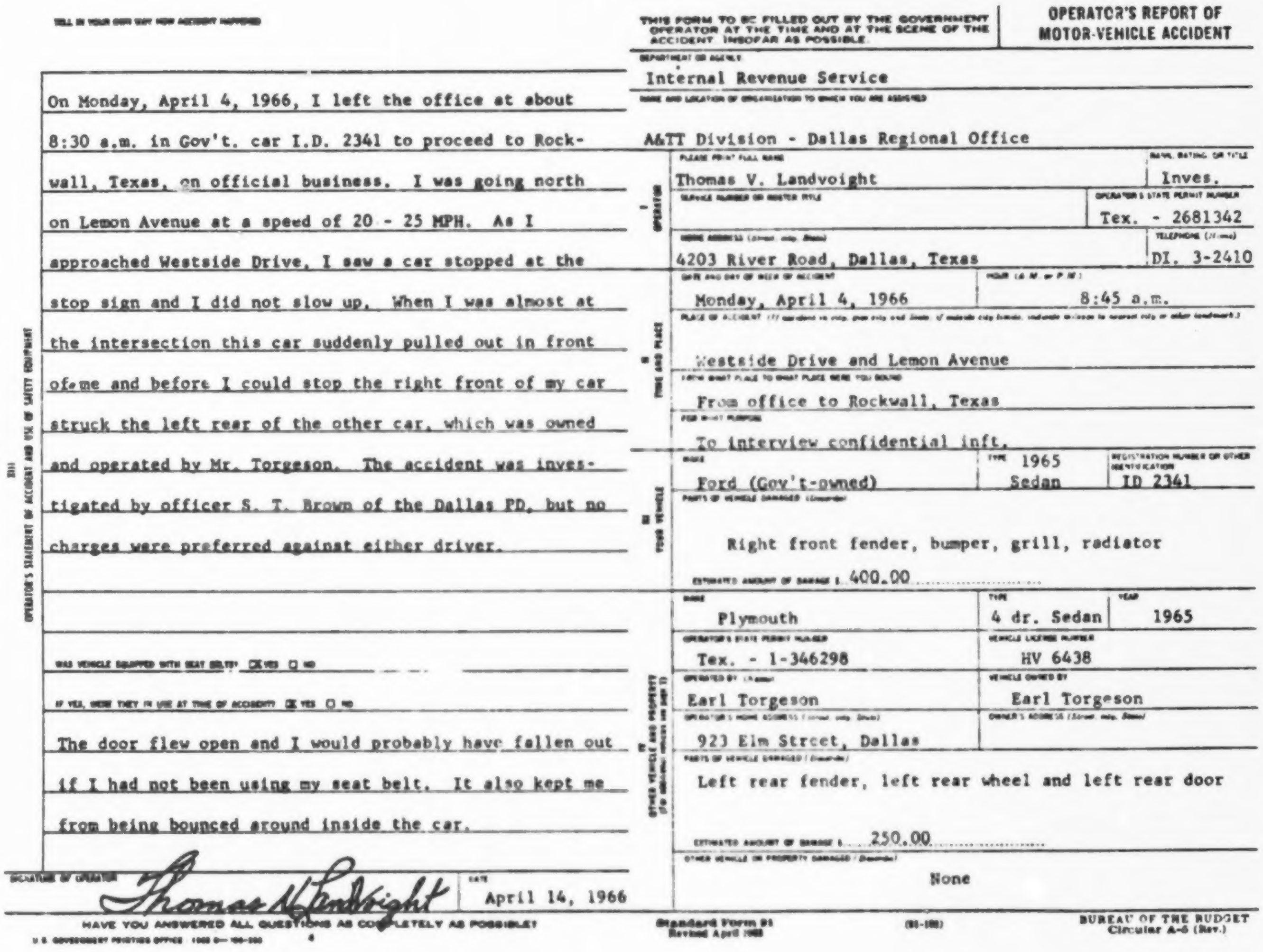
[6] If accident involves solely damage to a car owned by an employee and being operated on a reimbursable basis in the conduct of official business, only an informal investigation is required regardless of amount of damage.

[7] Formal investigation may be required under IRM 1(16)14.33:(1)(d) if determined necessary for Board of Inquiry action.

Titles of Forms:

Standard Form 91 —Operator's Report of Motor-Vehicle Accident
Standard Form 91A—Investigation Report of Motor Vehicle Accident
Standard Form 92 —Supervisor's Report of Accident
Standard Form 92a—Report of Accident Other than Motor Vehicle
Standard Form 26 —Data Bearing Upon Scope of Employment of Motor Vehicle Operator.

EXHIBIT 1(16)10-3



OPERATOR'S REPORT OF MOTOR-VEHICLE ACCIDENT

THIS FORM TO BE FILLED OUT BY THE GOVERNMENT OPERATOR AT THE TIME AND AT THE SCENE OF THE ACCIDENT INSOFAR AS POSSIBLE.

DEPARTMENT OR AGENCY: Internal Revenue Service

NAME AND LOCATION OF ORGANIZATION TO WHICH YOU ARE ASSIGNED: A&TT Division - Dallas Regional Office

I OPERATOR

PLEASE PRINT FULL NAME: Thomas V. Landvoight

RANK, RATING, OR TITLE: Inves.

SERVICE NUMBER OR ROSTER TITLE:

OPERATOR'S STATE PERMIT NUMBER: Tex. - 2681342

HOME ADDRESS (Street, city, State): 4203 River Road, Dallas, Texas

TELEPHONE (Home): DI. 3-2410

II TIME AND PLACE

DATE AND DAY OF WEEK OF ACCIDENT: Monday, April 4, 1966

HOUR (A.M. or P.M.): 8:45 a.m.

PLACE OF ACCIDENT: Westside Drive and Lemon Avenue

FROM WHAT PLACE TO WHAT PLACE WERE YOU BOUND: From office to Rockwall, Texas

FOR WHAT PURPOSE: To interview confidential inft.

III YOUR VEHICLE

MAKE: Ford (Gov't-owned)

TYPE: 1965 Sedan

REGISTRATION NUMBER OR OTHER IDENTIFICATION: ID 2341

PARTS OF VEHICLE DAMAGED (Describe): Right front fender, bumper, grill, radiator

ESTIMATED AMOUNT OF DAMAGE $ 400.00

IV OTHER VEHICLE AND PROPERTY

MAKE: Plymouth

TYPE: 4 dr. Sedan

YEAR: 1965

OPERATOR'S STATE PERMIT NUMBER: Tex. - 1-346298

VEHICLE LICENSE NUMBER: HV 6438

OPERATED BY (Name): Earl Torgeson

VEHICLE OWNED BY: Earl Torgeson

OPERATOR'S HOME ADDRESS (Street, city, State): 923 Elm Street, Dallas

OWNER'S ADDRESS (Street, city, State):

PARTS OF VEHICLE DAMAGED (Describe): Left rear fender, left rear wheel and left rear door

ESTIMATED AMOUNT OF DAMAGE $ 250.00

OTHER VEHICLE OR PROPERTY DAMAGED (Describe): None

VIII OPERATOR'S STATEMENT OF ACCIDENT AND USE OF SAFETY EQUIPMENT

TELL IN YOUR OWN WAY HOW ACCIDENT HAPPENED

On Monday, April 4, 1966, I left the office at about 8:30 a.m. in Gov't. car I.D. 2341 to proceed to Rockwall, Texas, on official business. I was going north on Lemon Avenue at a speed of 20 - 25 MPH. As I approached Westside Drive, I saw a car stopped at the stop sign and I did not slow up. When I was almost at the intersection this car suddenly pulled out in front of me and before I could stop the right front of my car struck the left rear of the other car, which was owned and operated by Mr. Torgeson. The accident was investigated by officer S. T. Brown of the Dallas PD, but no charges were preferred against either driver.

WAS VEHICLE EQUIPPED WITH SEAT BELTS? ☒ YES ☐ NO

IF YES, WERE THEY IN USE AT TIME OF ACCIDENT? ☒ YES ☐ NO

The door flew open and I would probably have fallen out if I had not been using my seat belt. It also kept me from being bounced around inside the car.

SIGNATURE OF OPERATOR: Thomas V. Landvoight

DATE: April 14, 1966

HAVE YOU ANSWERED ALL QUESTIONS AS COMPLETELY AS POSSIBLE?

U.S. GOVERNMENT PRINTING OFFICE

Standard Form 91
Revised April 1965

(91-101)

BUREAU OF THE BUDGET
Circular A-6 (Rev.)

EXHIBIT 1(16)10-3—*Cont.*

	NAME	HOME ADDRESS
V PERSONS INJURED	Earl Torgeson	923 Elm Street, Dallas
VI OCCUPANTS IN YOUR VEHICLE	None	
VII OCCUPANTS IN OTHER VEHICLE	Earl Torgeson	923 Elm Street, Dallas
VIII WITNESSES AND POLICE	Mildred Collins	4315 Westside Drive Dallas, Texas

POLICE OFFICER	BADGE NO.	PRECINCT OF HDQ.
Officer S. T. Brown	346	Dallas PD

IX THE ACCIDENT

	YOUR VEHICLE	OTHER VEHICLE
DIRECTION OF TRAVEL	North	West
SIDE OF STREET OR HIGHWAY	East side of Lemon Avenue	North side of Westside Dr.
APPROXIMATE SPEED (Miles per hour)	20 - 25 MPH	10 MPH

CONDITION OF ROADWAY (Wet or dry, etc.) Dry

WEATHER (Clear, foggy, rain, snow, etc.) Clear

TYPE OF ROADWAY (Concrete, macadam, etc.) Macadam

OTHER INFORMATION: Torgeson pulled out from the stop sign in front of Gov't car.

X EVENTS AFTER ACCIDENT

IF MEDICAL AID RENDERED, STATE BY WHOM: None

WHERE WAS INJURED TAKEN:

CONDITION OF OTHER DRIVER: Had bruised left shoulder and complained about headache but refused medical aid.

IF OTHER DRIVER OR PERSONS INJURED MADE STATEMENTS AS TO CAUSE OF ACCIDENT AND EXTENT OF PERSONAL OR PROPERTY DAMAGE, RELATE CONVERSATION AND NAMES AND ADDRESSES OF OTHERS HEARING SUCH STATEMENTS

Mr. Torgeson said in my presence after the accident that he did not see me proceeding up Lemon Avenue when he pulled out from the stop sign. He also said that since he was well into the intersection he felt the Government should pay the damage to his car.

XI OTHER VEHICLE AND PROPERTY

MAKE	TYPE	YEAR

OPERATOR'S STATE PERMIT NUMBER:

VEHICLE LICENSE NUMBER:

OPERATED BY:

OWNED BY:

ADDRESS:

OWNER'S ADDRESS:

PARTS OF VEHICLE DAMAGED (Describe):

OTHER PROPERTY DAMAGED (Describe):

XII INDICATE ON DIAGRAM BELOW WHAT HAPPENED

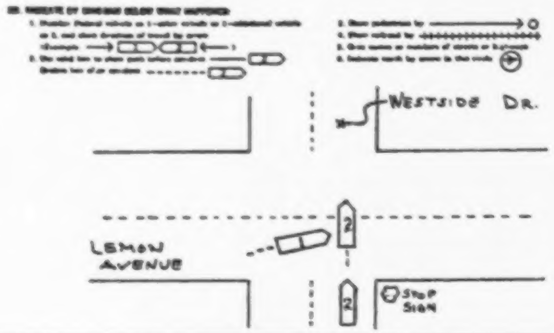


EXHIBIT 1(16)10-4

OPTIONAL FORM 26
MAY 1962
GSA CIRCULAR
NO. 287 5026-101

DATA BEARING UPON SCOPE OF EMPLOYMENT OF MOTOR VEHICLE OPERATOR

INSTRUCTIONS. This form is to be filled out by the operator at the time and at the scene of the accident, insofar as possible, and attached to the completed Standard Form 91, Operator's Report of Motor Vehicle Accident.

OPERATOR'S

1. NAME: Thomas V. Landvoight

2. TITLE AND JOB CLASSIFICATION: Special Investigator, A&TT - GS 11

3. AGENCY NAME AND BEGINNING DATE OF DUTY:
Alcohol and Tobacco Tax Division
Internal Revenue Service
Southwest Regional Office   Jan. 4, 1958

4. ESTABLISHED WORKING HOURS: FROM 8:15 A.M. P.M. TO 4:45 A.M. P.M.

5. IMMEDIATE SUPERVISOR (Name): Marvin P. Jones

6. SUPERVISOR'S TITLE: Supervisor in Charge

VEHICLE OWNERSHIP

7. VEHICLE IS (Check one only): ☒ a. GOVERNMENT-OWNED ☐ b. NOT GOVERNMENT-OWNED

ID 2341 (Identification No.)

(License No.)

8. IF BLOCK 7b. IS CHECKED, IS TITLE TO VEHICLE REGISTERED IN OPERATOR'S NAME? ☐ YES ☐ NO

If "NO" give details as to how vehicle is titled.

9. WAS THIS VEHICLE ASSIGNED TO OPERATOR BY A GSA MOTOR POOL? ☐ YES ☒ NO

If "YES" give details and location of the GSA Motor Pool.

If "NO" what activity assigned the vehicle?
Alcohol and Tobacco Tax Division
Internal Revenue Service
Southwest Regional Office

10. HOW DID OPERATOR RECEIVE AUTHORITY FOR USE OF VEHICLE? ☐ ORALLY ☒ WRITTEN AUTHORITY

Give details:

Assigned by Division Director to use in Enforcement activities

DETAILS OF TRIP DURING WHICH ACCIDENT OCCURRED

11. ORIGIN: Southwest IRS Regional Office
1114 Commerce St., Dallas, Texas

12. DESTINATION: Rockwall, Texas

13. EXACT PURPOSE OF TRIP: To interview confidential informant

14. DATE AND TIME TRIP BEGAN: Apr 4 1966 - 8:30a.m

15. DATE AND TIME OF ACCIDENT: Apr 4 1966 - 8:45 a m

16. HOW DID OPERATOR RECEIVE AUTHORITY FOR TRIP? ☐ ORALLY ☒ WRITTEN AUTHORITY

Give details:

By memorandum from supervisor in charge assigning me to this case.

17. WAS THERE ANY DEVIATION FROM DIRECT ROUTE? ☐ YES ☒ NO

If "YES" explain in detail:

18. WAS TRIP MADE WITHIN ESTABLISHED WORKING HOURS? ☒ YES ☐ NO

If "NO" explain.

19. DID OPERATOR WHILE ENROUTE ENGAGE IN ANY ACTIVITY OTHER THAN THAT FOR WHICH THIS TRIP WAS AUTHORIZED? ☐ YES ☒ NO

If "YES" explain:

20. STATE BELOW FULL DETAILS OF THE AUTHORITY FOR, THE NATURE OF, AND CIRCUMSTANCES SURROUNDING THE TRIP NOT OTHERWISE COVERED ABOVE OR ON THE ACCOMPANYING SF-91.

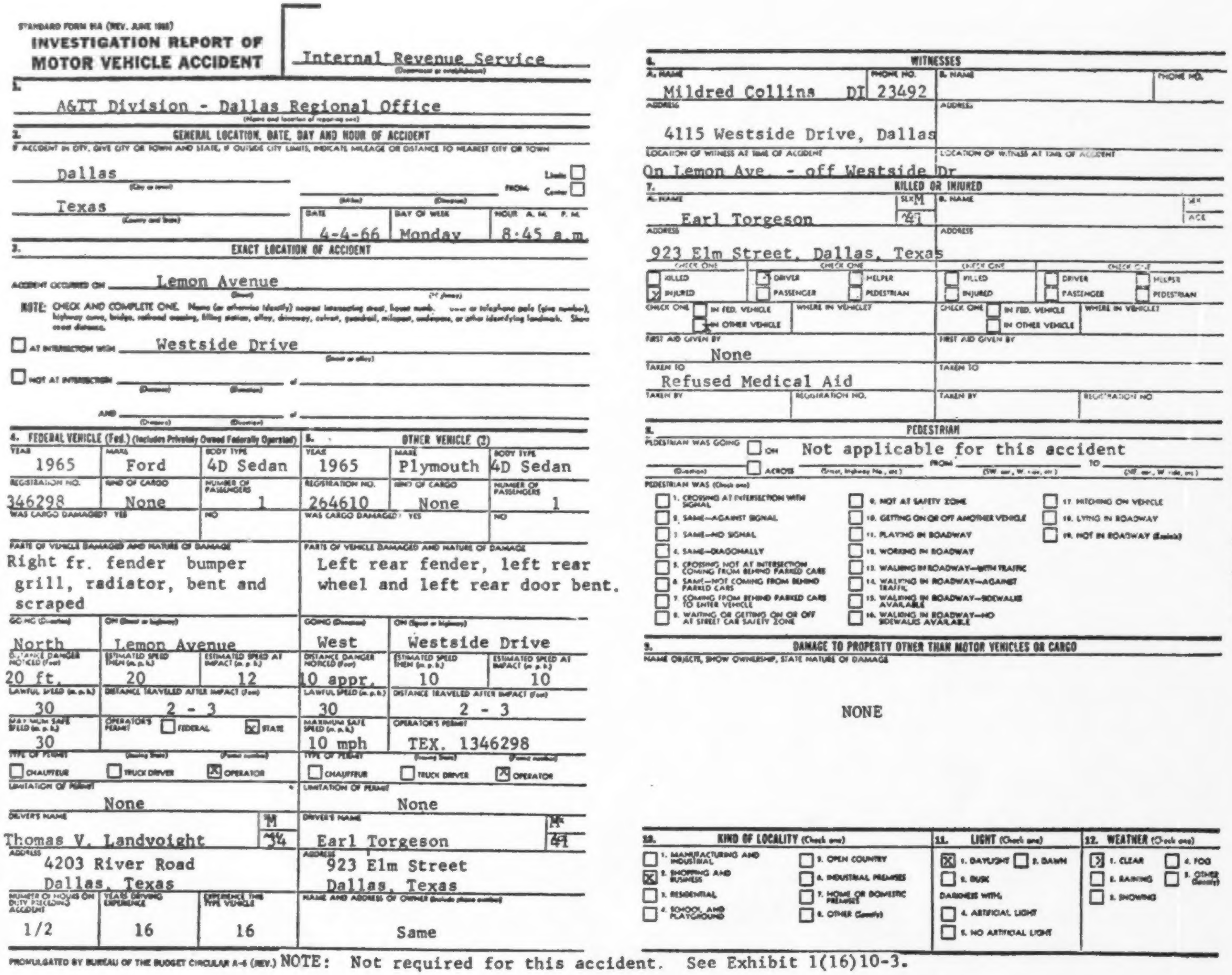
All circumstances covered above or on SF 91.

(Continue on reverse)

OPERATOR'S	SIGNATURE Thomas V. Landvoight	DATE April 4 1966
	The information contained herein is true and correct to the best of my knowledge and belief.	
SUPERVISOR'S	SIGNATURE Marvin P. Jones	DATE April 6 1966

U.S. GOVERNMENT PRINTING OFFICE 1962 O—[illegible]

EXHIBIT 1(16)10-5



STANDARD FORM 91A (REV. JUNE 1965)

INVESTIGATION REPORT OF MOTOR VEHICLE ACCIDENT

Internal Revenue Service
(Department or establishment)

1.
A&TT Division - Dallas Regional Office
(Name and location of reporting unit)

2. GENERAL LOCATION, DATE, DAY AND HOUR OF ACCIDENT

IF ACCIDENT IN CITY, GIVE CITY OR TOWN AND STATE, IF OUTSIDE CITY LIMITS, INDICATE MILEAGE OR DISTANCE TO NEAREST CITY OR TOWN

Dallas
(City or town)

Texas
(County and State)

(Miles) (Direction) FROM ☐ Limits ☐ Center

DATE	DAY OF WEEK	HOUR A. M. P. M.
4-4-66	Monday	8:45 a.m.

3. EXACT LOCATION OF ACCIDENT

ACCIDENT OCCURRED ON Lemon Avenue (Street) (1st fines)

NOTE: CHECK AND COMPLETE ONE. Name (or otherwise identify) nearest intersecting street, house numb. ... or telephone pole (give number), highway curve, bridge, railroad crossing, filling station, alley, driveway, culvert, guardrail, milepost, underpass, or other identifying landmark. Show exact distance.

☐ AT INTERSECTION WITH Westside Drive (Street or alley)

☐ NOT AT INTERSECTION ______ (Distance) ______ (Direction) of ______

AND ______ (Distance) ______ (Direction) of ______

4. FEDERAL VEHICLE (Fed.) (Includes Privately Owned Federally Operated)

YEAR 1965	MAKE Ford	BODY TYPE 4D Sedan
REGISTRATION NO. 346298	KIND OF CARGO None	NUMBER OF PASSENGERS 1
WAS CARGO DAMAGED? YES	NO	

PARTS OF VEHICLE DAMAGED AND NATURE OF DAMAGE
Right fr. fender bumper grill, radiator, bent and scraped

GOING (Direction) North	ON (Street or highway) Lemon Avenue	
DISTANCE DANGER NOTICED (Feet) 20 ft.	ESTIMATED SPEED THEN (m. p. h.) 20	ESTIMATED SPEED AT IMPACT (m. p. h.) 12
LAWFUL SPEED (m. p. h.) 30	DISTANCE TRAVELED AFTER IMPACT (Feet) 2 - 3	
MAXIMUM SAFE SPEED (m. p. h.) 30	OPERATOR'S PERMIT ☐ FEDERAL ☒ STATE	
TYPE OF PERMIT ☐ CHAUFFEUR	(Issuing State) ☐ TRUCK DRIVER	(Permit number) ☒ OPERATOR
LIMITATION OF PERMIT None		
DRIVER'S NAME Thomas V. Landvoight		SEX M AGE 34
ADDRESS 4203 River Road Dallas, Texas		
NUMBER OF HOURS ON DUTY PRECEDING ACCIDENT 1/2	YEARS DRIVING EXPERIENCE 16	EXPERIENCE THIS TYPE VEHICLE 16

5. OTHER VEHICLE (2)

YEAR 1965	MAKE Plymouth	BODY TYPE 4D Sedan
REGISTRATION NO. 264610	KIND OF CARGO None	NUMBER OF PASSENGERS 1
WAS CARGO DAMAGED? YES	NO	

PARTS OF VEHICLE DAMAGED AND NATURE OF DAMAGE
Left rear fender, left rear wheel and left rear door bent.

GOING (Direction) West	ON (Street or highway) Westside Drive	
DISTANCE DANGER NOTICED (Feet) 10 appr.	ESTIMATED SPEED THEN (m. p. h.) 10	ESTIMATED SPEED AT IMPACT (m. p. h.) 10
LAWFUL SPEED (m. p. h.) 30	DISTANCE TRAVELED AFTER IMPACT (Feet) 2 - 3	
MAXIMUM SAFE SPEED (m. p. h.) 10 mph	OPERATOR'S PERMIT TEX. 1346298	
TYPE OF PERMIT ☐ CHAUFFEUR	(Issuing State) ☐ TRUCK DRIVER	(Permit number) ☒ OPERATOR
LIMITATION OF PERMIT None		
DRIVER'S NAME Earl Torgeson		SEX M AGE 41
ADDRESS 923 Elm Street Dallas, Texas		
NAME AND ADDRESS OF OWNER (Include phone number) Same		

6. WITNESSES

A. NAME Mildred Collins	PHONE NO. DI 23492	B. NAME	PHONE NO.
ADDRESS 4115 Westside Drive, Dallas		ADDRESS	
LOCATION OF WITNESS AT TIME OF ACCIDENT On Lemon Ave. - off Westside Dr		LOCATION OF WITNESS AT TIME OF ACCIDENT	

7. KILLED OR INJURED

A. NAME Earl Torgeson	SEX M AGE 41	B. NAME	SEX AGE
ADDRESS 923 Elm Street, Dallas, Texas		ADDRESS	
CHECK ONE ☐ KILLED ☒ INJURED	CHECK ONE ☒ DRIVER ☐ PASSENGER ☐ HELPER ☐ PEDESTRIAN	CHECK ONE ☐ KILLED ☐ INJURED	CHECK ONE ☐ DRIVER ☐ PASSENGER ☐ HELPER ☐ PEDESTRIAN
CHECK ONE ☐ IN FED. VEHICLE ☒ IN OTHER VEHICLE	WHERE IN VEHICLE?	CHECK ONE ☐ IN FED. VEHICLE ☐ IN OTHER VEHICLE	WHERE IN VEHICLE?
FIRST AID GIVEN BY None		FIRST AID GIVEN BY	
TAKEN TO Refused Medical Aid		TAKEN TO	
TAKEN BY	REGISTRATION NO.	TAKEN BY	REGISTRATION NO.

8. PEDESTRIAN

PEDESTRIAN WAS GOING ☐ ON ☐ ACROSS Not applicable for this accident
______ (Direction) ______ (Street, highway No., etc.) FROM ______ (SW cor., W. side, etc.) TO ______ (NE cor., W. side, etc.)

PEDESTRIAN WAS (Check one)

☐ 1. CROSSING AT INTERSECTION WITH SIGNAL
☐ 2. SAME—AGAINST SIGNAL
☐ 3. SAME—NO SIGNAL
☐ 4. SAME—DIAGONALLY
☐ 5. CROSSING NOT AT INTERSECTION COMING FROM BEHIND PARKED CARS
☐ 6. SAME—NOT COMING FROM BEHIND PARKED CARS
☐ 7. COMING FROM BEHIND PARKED CARS TO ENTER VEHICLE
☐ 8. WAITING OR GETTING ON OR OFF AT STREET CAR SAFETY ZONE
☐ 9. NOT AT SAFETY ZONE
☐ 10. GETTING ON OR OFF ANOTHER VEHICLE
☐ 11. PLAYING IN ROADWAY
☐ 12. WORKING IN ROADWAY
☐ 13. WALKING IN ROADWAY—WITH TRAFFIC
☐ 14. WALKING IN ROADWAY—AGAINST TRAFFIC
☐ 15. WALKING IN ROADWAY—SIDEWALKS AVAILABLE
☐ 16. WALKING IN ROADWAY—NO SIDEWALKS AVAILABLE
☐ 17. HITCHING ON VEHICLE
☐ 18. LYING IN ROADWAY
☐ 19. NOT IN ROADWAY (Explain)

9. DAMAGE TO PROPERTY OTHER THAN MOTOR VEHICLES OR CARGO

NAME OBJECTS, SHOW OWNERSHIP, STATE NATURE OF DAMAGE

NONE

10. KIND OF LOCALITY (Check one)

☐ 1. MANUFACTURING AND INDUSTRIAL
☒ 2. SHOPPING AND BUSINESS
☐ 3. RESIDENTIAL
☐ 4. SCHOOL AND PLAYGROUND
☐ 5. OPEN COUNTRY
☐ 6. INDUSTRIAL PREMISES
☐ 7. HOME OR DOMESTIC PREMISES
☐ 8. OTHER (Specify)

11. LIGHT (Check one)

☒ 1. DAYLIGHT ☐ 2. DAWN
☐ 3. DUSK
DARKNESS WITH,
☐ 4. ARTIFICIAL LIGHT
☐ 5. NO ARTIFICIAL LIGHT

12. WEATHER (Check one)

☒ 1. CLEAR
☐ 2. RAINING
☐ 3. SNOWING
☐ 4. FOG
☐ 5. OTHER (Specify)

PROMULGATED BY BUREAU OF THE BUDGET CIRCULAR A-6 (REV.) NOTE: Not required for this accident. See Exhibit 1(16)10-3.

EXHIBIT 1(16)10-5—*Cont.*

13. CONDITION OF DRIVER AND PEDESTRIAN

Check for each person — FED 2 PED

- ☒ ☒ ☐ 1A. HAD NOT BEEN DRINKING
- ☐ ☐ ☐ 1B. HAD BEEN DRINKING, IF SO:
- ☐ ☐ ☐ 2. ABILITY IMPAIRED
- ☐ ☐ ☐ 3. ABILITY NOT IMPAIRED
- ☐ ☐ ☐ 4. NOT KNOWN WHETHER IMPAIRED

Check one or more — FED 2 PED

- ☐ ☐ ☐ 5. PHYSICAL DEFECT
- ☐ 6. OTHER HANDICAPS, CARRYING BUNDLES, UMBRELLAS, ETC.
- ☐ ☐ 7. SLEEPY, FATIGUED, ETC.
- ☐ ☐ 8. APPARENTLY ASLEEP
- ☒ ☒ ☐ 9. APPARENTLY NORMAL.

14. CONDITION OF VEHICLE

Check one or more for each vehicle — FED 2

- ☐ ☐ 1. DEFECTIVE BRAKES
- ☐ ☐ 2. ONE HEADLIGHT OUT
- ☐ ☐ 3. BOTH HEADLIGHTS OUT
- ☐ ☐ 4. TAILLIGHT OUT OR OBSCURED
- ☐ ☐ 5. DIM, COWL, OR FENDER LIGHTS ONLY
- ☐ ☐ 6. SIGNAL LIGHTS DEFECTIVE
- ☐ ☐ 7. OTHER LIGHTS OR REFLECTORS DEFECTIVE
- ☐ ☐ 8. TIRE BLEW OUT
- ☐ ☐ 9. DEFECTIVE STEERING MECHANISM
- ☒ ☒ 10. NO APPARENT DEFECTS
- ☐ ☐ 11. OTHER DEFECTS (Specify)

15. VISION OBSCURED BY

Check where applicable — FED 2

- ☐ ☐ 1. RAIN, SNOW, ETC., ON WINDSHIELD
- ☐ ☐ 2. CRACKED WINDSHIELD
- ☐ ☐ 3. DIRTY WINDSHIELD, WINDOWS
- ☐ ☐ 4. WINDSHIELD, WINDOWS NOT GLASS
- ☐ ☐ 5. TREES, CROPS, ETC.
- ☐ ☐ 6. BUILDING
- ☐ ☐ 7. EMBANKMENT
- ☐ ☐ 8. SIGNBOARDS
- ☐ ☐ 9. PARKED VEHICLE
- ☐ ☐ 10. MOVING VEHICLE
- ☐ ☐ 11. OTHER (Specify)

16. ROAD CHARACTER

Check one in each section

- ☒ 1. STRAIGHT
- ☐ 2. SHARP CURVE OR TURN
- ☐ 3. OTHER CURVES
- ☐ 1. LEVEL
- ☐ 2. UP HILL
- ☐ 3. HILL CREST
- ☐ 4. DOWN HILL

17. ROAD SURFACE

Check one

- ☐ 1. CONCRETE
- ☐ 2. BRICK
- ☒ 3. BLACK TOP
- ☐ 4. GRAVEL, SAND, OR DIRT—OILED
- ☐ 5. GRAVEL, SAND, OR DIRT—UNOILED
- ☐ 6. OTHER (Specify)

18. ROAD CONDITION

Check one

- ☒ 1. DRY
- ☐ 2. WET
- ☐ 3. MUDDY
- ☐ 4. SNOWY
- ☐ 5. ICY

Check one or more

- ☐ 6. LOOSE MATERIAL ON SURFACE
- ☐ 7. HOLES, DEEP RUTS
- ☐ 8. DEFECTIVE SHOULDERS
- ☒ 9. NO DEFECTS
- ☐ 10. OTHER DEFECTS (Specify)

WAS ROAD UNDER CONSTRUCTION OR REPAIR? ☐ YES ☒ NO

19. TRAFFIC CONTROL

Check one or more — Functioning / Not Functioning

- ☐ ☐ 1. R. R. CROSSING GATES
- ☐ ☐ 2. R. R. AUTOMATIC SIGNAL
- ☐ ☐ 3. OFFICER OR WATCHMAN
- ☐ ☐ 4. STOP AND GO LIGHT
- ☒ ☐ 5. STOP SIGN
- ☐ ☐ 6. WARNING SIGN OR SIGNAL
- ☐ ☐ 7. FLAGS OR FLARES
- ☐ 8. NO CONTROL PRESENT

20. DRIVER'S ACTIONS

Check one for each driver — FED 2

- ☐ ☐ 1. MAKING RIGHT TURN
- ☐ ☒ 2. MAKING LEFT TURN
- ☐ ☐ 3. MAKING U TURN
- ☒ ☐ 4. GOING STRAIGHT AHEAD
- ☐ ☐ 5. SLOWING DOWN, STOPPING
- ☐ ☐ 6. OVERTAKING, PASSING
- ☐ ☐ 7. FORWARD FROM PARKING SPACE
- ☐ ☐ 8. BACKWARD FROM PARKING SPACE
- ☐ ☐ 9. OTHER BACKING
- ☐ ☐ 10. STOPPED IN TRAFFIC LANE
- ☐ ☐ 11. OTHER (Specify)

Check if applicable — FED 2

- ☐ ☐ 12. SKIDDING
- ☐ ☐ 13. AVOIDING VEHICLE, OBJECT, OR PEDESTRIAN
- ☐ ☐ 14. EMERGING FROM ALLEY OR DRIVEWAY
- ☐ ☐ 15. DISABLED VEHICLE, PARKED
- ☐ ☐ 16. GAVE WARNING (Horn, Signal, Indicator)

21. VIOLATIONS

Check one or more — FED 2

- ☐ ☐ 1. EXCEEDING LAWFUL SPEED
- ☐ ☐ 2. DID NOT HAVE RIGHT-OF-WAY
- ☐ ☐ 3. ON WRONG SIDE OF ROAD
- ☐ ☐ 4. DROVE THROUGH SAFETY ZONE
- ☐ ☐ 5. PASSING STANDING STREETCAR
- ☐ ☐ 6. PASSING ON HILL
- ☐ ☐ 7. PASSING ON CURVE
- ☐ ☐ 8. CUTTING IN
- ☐ ☐ 9. FOLLOWING TOO CLOSELY
- ☐ ☐ 10. FAILURE TO SIGNAL OR IMPROPER SIGNAL
- ☐ ☐ 11. WIDE RIGHT TURN
- ☐ ☐ 12. CUT CORNER ON LEFT TURN
- ☐ ☐ 13. TURN FROM WRONG LANE
- ☐ ☒ 14. DISREGARDED STOP SIGN
- ☐ ☐ 15. DISREGARDED WARNING SIGN OR SIGNAL
- ☐ ☐ 16. DISREGARDED STOP AND GO LIGHT
- ☐ ☐ 17. DISREGARDED POLICE OFFICER
- ☐ ☐ 18. IMPROPER STARTING FROM PARKED POSITION
- ☐ ☐ 19. IMPROPER PARKING
- ☐ ☐ 20. NO IMPROPER DRIVING INDICATED
- ☐ ☐ 21. OTHER IMPROPER ACTION (Specify)

22. ROAD WIDTHS AND LANES

WIDTH OF ROAD OR PAVEMENT: 35 feet (Both Sts.)

NUMBER OF LANES: 4

WERE LANES MARKED? Center line on Lemon

WERE LANES SEPARATED? No

BY WHAT? No marks on Westside

23. POLICE ACTION, IF ANY

CHARGE: None

NAME OF PERSON CHARGED:

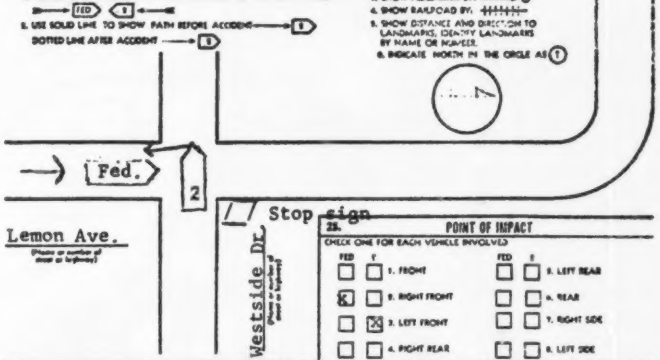
NAME, BADGE NUMBER, AND DEPT. OF POLICE OFFICER:

10—67616-1

24. INDICATE ON THIS DIAGRAM HOW ACCIDENT HAPPENED

Use one of these outlines to sketch the scene of the accident, writing in street or highway names or numbers.

1. NUMBER EACH VEHICLE AND SHOW DIRECTION OF TRAVEL BY ARROW
2. USE SOLID LINE TO SHOW PATH BEFORE ACCIDENT; DOTTED LINE AFTER ACCIDENT
3. SHOW PEDESTRIAN BY: ——→ ○
4. SHOW RAILROAD BY: ┼┼┼┼┼┼
5. SHOW DISTANCE AND DIRECTION TO LANDMARKS, IDENTIFY LANDMARKS BY NAME OR NUMBER.
6. INDICATE NORTH IN THE CIRCLE AS ↑


FED
2
Fed.
2
Stop sign
Lemon Ave.
(Name or number of street or highway)
Westside Dr.
(Name or number of street or highway)

25. POINT OF IMPACT

CHECK ONE FOR EACH VEHICLE INVOLVED — FED 2

- ☐ ☐ 1. FRONT
- ☒ ☐ 2. RIGHT FRONT
- ☐ ☒ 3. LEFT FRONT
- ☐ ☐ 4. RIGHT REAR
- ☐ ☐ 5. LEFT REAR
- ☐ ☐ 6. REAR
- ☐ ☐ 7. RIGHT SIDE
- ☐ ☐ 8. LEFT SIDE

26. DESCRIBE WHAT HAPPENED

REFER TO VEHICLES BY "FED" AND "2"

Fed. vehicle was being driven by Investigator Landvoight north on Lemon Avenue at a legal and reasonable rate of speed when vehicle "2" suddenly pulled out from a stop sign right in front of the Fed. car, which could not be stopped in time to avoid the collision.

27. SIGNATURE OF INVESTIGATOR: Tony Thomas

TITLE: Special Investigator

DATE: 4/5/66

28. STATEMENT OF REVIEWING OFFICIAL

WAS THE DRIVER ACTING WITHIN THE SCOPE OF HIS EMPLOYMENT? STATE BASIS FOR ANSWER ☒ YES ☐ NO

Assigned by me to go to Rockwall

WHAT CAUSED THE ACCIDENT?

Apparently other driver pulled out from stop sign without looking

HOW COULD IT HAVE BEEN PREVENTED?

Proper attention to driving by both drivers.

WHAT ACTION HAS BEEN TAKEN? Employee was cautioned to always drive defensively. He is also scheduled to see the film, "Take Time to Think"

USE THIS SPACE TO SHOW CONSEQUENCES OF ACCIDENT AFFECTING AGENCY PERSONNEL REPORTED IN SECTION 7.

A. ☐ MILITARY PERSONNEL ☒ CIVILIAN PERSONNEL

PROBABLE DISABILITY: None

NATURE OF INJURY AND PART OF BODY:

DATE STOPPED WORK:

DATE RESUMED WORK:

B. ☐ MILITARY PERSONNEL ☐ CIVILIAN PERSONNEL

PROBABLE DISABILITY:

NATURE OF INJURY AND PART OF BODY:

DATE STOPPED WORK:

DATE RESUMED WORK:

SIGNATURE OF REVIEWING OFFICIAL: Marvin P. James

TITLE (Civilian or military): Supervisor in Charge

DATE: 4-6-66

10—67616-2 U. S. GOVERNMENT PRINTING OFFICE

EXHIBIT 1(16)10-6

Standard Form 92a
PROMULGATED JUNE 1953 BY BUREAU OF THE BUDGET
CIRCULAR A-5 (REV.)

REPORT OF ACCIDENT OTHER THAN MOTOR VEHICLE

DEPARTMENT OR AGENCY Internal Revenue Service	ACCIDENT OCCURRED IN—	
NAME AND ADDRESS OF LOCAL REPORTING ORGANIZATION Boston District Office - 174 Ipswich Street, Boston, Mass.	GOVERNMENT OPERATION X	CONTRACTOR OPERATION

TIME AND PLACE OF ACCIDENT	DATE OF ACCIDENT 3-23-66	TIME 2:30 p.m.	EXACT LOCATION OF ACCIDENT Room 324

PERSON OR PERSONS INJURED

NAMES	ADDRESSES
Mrs. Ada Gould	1308 Rountree Drive
	Boston, Massachusetts

NATURE AND EXTENT OF INJURIES

Broken left arm, bruises and contusions.

PROPERTY DAMAGED

NAME OF OWNER	ADDRESS OF OWNER
Mrs. Ada Gould	Same as above

DESCRIPTION AND LOCATION OF PROPERTY

When Mrs. Gould fell and was injured, she also tore her dress and her stockings.

NATURE AND EXTENT OF DAMAGE

Both dress and stockings badly torn - irreparable.

FULL DESCRIPTION OF ACCIDENT *(Use Reverse Side, If Necessary)*

Mrs. Gould had called at the office to obtain assistance in connection with completing a form required by Internal Revenue Service. In walking across the floor in Rm. 324 she stumbled over a raised electrical outlet. It had been installed for the operation of an office machine which had been moved. The outlet was overlooked and had not been removed. In falling she tried to catch herself with her left arm and the weight caused a fracture.

WITNESSES

IMPORTANT.—Be particular to secure the names and addresses of witnesses, bystanders, or persons in the immediate vicinity who may have seen the accident or heard any statement made by the person injured.

NAMES	ADDRESSES
George O. Standish	District Office, Boston
Melvin Hardesty	32 Dodge Street, Holyoke, Mass.

DATE OF THIS REPORT	TITLE OR POSITION	SIGNATURE OF PERSON EXECUTING THIS FORM
March 25, 1966	Collection Officer	George O. Standish

EXHIBIT 1(16)10-7

Standard Form 92
PROMULGATED DEC. 1947 BY
BUREAU OF THE BUDGET
CIRCULAR A-5 (REV.)
92-102

SUPERVISOR'S REPORT OF ACCIDENT

DO NOT USE FOR MOTOR VEHICLE OR AIRCRAFT ACCIDENT

(See Instructions on Back. Use Additional Sheets if Necessary)

Section I REPORTING UNIT

1a. TO: *(Appropriate Headquarters)* Chief, Facilities Management Branch

b. FROM: *(Reporting Dept., etc., and location - Include town and State or foreign country)* Internal Revenue Service, Office Audit Branch
300 E. 8th St., Somewhere, U.S.A.

2. ACCIDENT OCCURRED IN

GOVERNMENT OPERATION	CONTRACTOR OPERATION
X	

DO NOT USE
CODE

Section II WHEN, WHERE, HOW, AND WHY ACCIDENT OCCURRED AND CORRECTIVE ACTION

3. DATE OF ACCIDENT	4. TIME	5. EXACT LOCATION OF ACCIDENT
2-14-66	3:15 p.m.	Office Audit Branch Secretary's desk, 1st floor, Federal Bldg., Somewhere, U.S.A.

6. DESCRIPTION BY INJURED PERSON; IF PROPERTY DAMAGE ONLY, BY PERSONS MOST CLOSELY ASSOCIATED WITH ACCIDENT *(Tell the complete story of what happened; no signature required.)*

Employee tripped over typewriter cord extending beyond desk.

7. DESCRIPTION BY RESPONSIBLE SUPERVISOR—CIVILIAN OR MILITARY *(What led up to the accident, how did accident actually happen? Explain if anything was wrong with equipment, material, or layout and what was done wrong. Be specific.)*

Jane Doe was taking some work to Robert Roe when her feet became entangled in typewriter cord. She fell on both knees and left elbow. Typewriter cord was extended beyond desk.

8. WHAT ACTUALLY HAS BEEN DONE TO CORRECT CONDITIONS CAUSING THE ACCIDENT?

The cord has been taped temporarily to side of desk.

9. WHAT REMAINS TO BE DONE TO CORRECT SUCH CONDITIONS AND WHY?

The cord needs to be rerouted under the desk.

Section III CONSEQUENCES AND RELATED DATA

10a. INJURY TO: *(Check one)*

REPORTING AGENCY

(1) MILITARY PERSONNEL	(2) CIVILIAN PERSONNEL	(3) CONTRACTOR PERSONNEL
	X	

OTHER

(4) OTHER FEDERAL AGENCY PERSONNEL	(5) NONFEDERAL PERSON

10b. PROBABLE DISABILITY *(Check one)*

(1) DEATH	(4) TEMPORARY TOTAL X
(2) PERMANENT TOTAL	(5) TEMPORARY PARTIAL
(3) PERMANENT PARTIAL	(6) FIRST AID

10c. ESTIMATED DAMAGE TO PROPERTY OR EQUIPMENT *(Fill in one or more)*

(1) REPORTING AGENCY	$
(2) CONTRACTOR*	$
(3) OTHER FEDERAL AGENCY	$
(4) NONFEDERAL	$

* *Contractor of reporting agency*

11. DESCRIPTION OF PROPERTY OR EQUIPMENT DAMAGED

12. OWNERSHIP OF PROPERTY OR EQUIPMENT DAMAGED *(Name and home address)*

13. NAME AND HOME ADDRESS OF INJURED Jane Doe 4518 Westfield St., Somewhere, USA

14. SEX F

15. AGE 41

16. BADGE OR SERVICE NO.

17. REGULAR OCCUPATION OF INJURED Clerk-Typist

18. OFFICIAL ASSIGNMENT AT TIME OF ACCIDENT Clerk-Typist

19. NATURE OF INJURY AND PART OF BODY INVOLVED Swollen & bruised elbow and knees. Fluid in right knee.

20. DATE INJURED STOPPED WORK 2-14-66

21. DATE INJURED RETURNED TO WORK 2-21-66 (Est.)

Sec. IV WITNESSES

22. NAMES AND ADDRESSES OF WITNESSES

Mrs. Roberta Albeit	District Office, Internal Revenue Somewhere, U.S.A.
Mr. Clyde LaVance	District Office, Internal Revenue Somewhere, U.S.A.

Sec. V SUPERVISOR

23. DATE	TITLE *(Civilian or military)*	SIGNATURE OF SUPERVISOR
2-16-66	Supervisor OA; Control Branch	John R. Randall

Section VI REVIEW AND COMMENT

24. COMMENTS ON ADEQUACY OF CORRECTIVE ACTION TAKEN, OR PLANNED, INCLUDING PROGRESS ON PENDING ACTIONS

Adequate corrective action has been taken by rerouting the cord under the desk so that it is no longer a hazard.

25. DATE	TITLE *(Civilian or military)*	SIGNATURE OF REVIEWING OFFICIAL
2-23-66	Chief, Office Audit Branch	Perry J. Kitchens Perry J. Kitchens

10—69681-9

EXHIBIT 1(16)10–7—*Cont.*

INSTRUCTIONS

SCOPE: Form applies to every accident, except motor vehicle and aircraft, arising out of the operation of a Federal Department or Establishment which results in injury to a person, or damage to property.

This form may be used similarly for operations performed by contractors under the jurisdiction of the reporting department, item 1b. It is not a substitute for any report to the Bureau of Employees' Compensation, but the reverse side of Form C. A. 1 of that Bureau should hereafter not be used.

PREPARATION: Answers must be given to all items on the form except as noted below: Accidents resulting in injury only, require answers to all items except 10c, 11, and 12; accidents resulting in property damage only, require answers to all items except 10a, 10b, and 13 through 21 inclusive; accidents resulting in injury and property damage require answers to all items. If a single accident involves injury to more than one person or damage to the property of more than one owner, a separate Form 92 is to be filled out for each injured person or each owner of damaged property.

SECTION I

Item 2. GOVERNMENT OPERATION.—Work performed by Government forces.

CONTRACTOR OPERATION.—Operation performed by a contractor's forces under jurisdiction of the reporting department named in item 1b.

SECTION II

Item 3. Date of accident.

Item 4. Hour of day or military time.

Item 5. Building or other exact location. Include town and State or foreign country.

Items 6, 7. Items must provide all possible information on what happened and a basis for answering items 8 and 9.

SECTION III

Item 10a. Injury to—Self-explanatory.

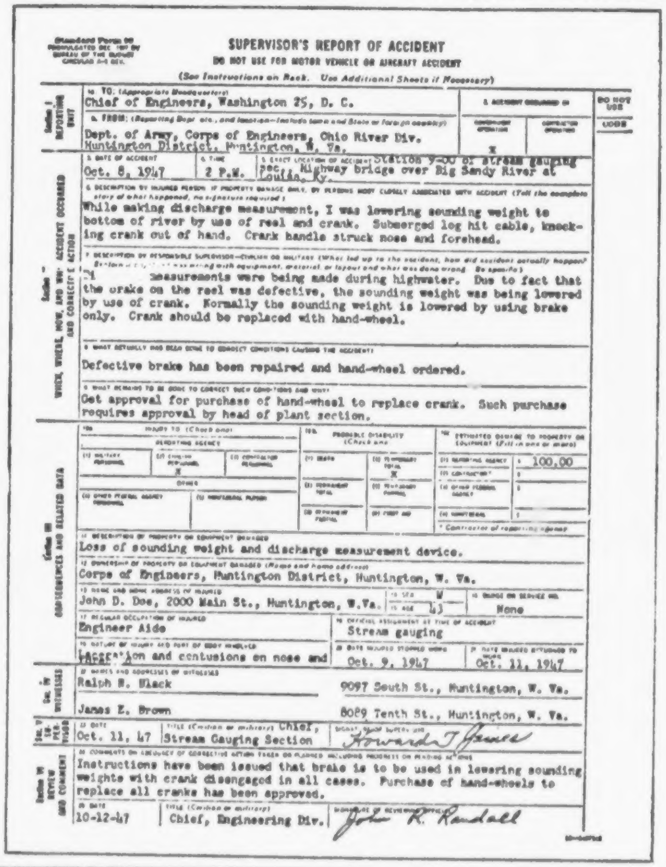
REPORTING AGENCY.—Department or establishment indicated in item 1b.

Item 10b. (1) DEATH.—Self-explanatory.

(2) PERMANENT TOTAL. — An injury which permanently and totally incapacitates a person from following any gainful occupation.

(3) PERMANENT PARTIAL.—An injury which results in the loss of any member or part of a member of the body, or any permanent impairment of functions of the body or part thereof to any degree less than permanent total disability.

(4) TEMPORARY TOTAL.—An injury other than the above which renders the injured person unable to perform a regularly established job on any day or shift subsequent to the day of injury (*including Saturdays, Sundays, and days off*).



Standard Form 92
Promulgated Dec. 1947 by
Bureau of the Budget
Circular A-6 Rev.

SUPERVISOR'S REPORT OF ACCIDENT

DO NOT USE FOR MOTOR VEHICLE OR AIRCRAFT ACCIDENT

(*See Instructions on Back. Use Additional Sheets if Necessary*)

Section I REPORTING UNIT

1a. TO: (Appropriate Headquarters)
Chief of Engineers, Washington 25, D. C.

b. FROM: (Reporting Dept. etc., and location—include town and State or foreign country)
Dept. of Army, Corps of Engineers, Ohio River Div.
Huntington District, Huntington, W. Va.

2. ACCIDENT OCCURRED IN
Government operation: X
Contractor operation:

DO NOT USE
CODE

Section II WHEN, WHERE, HOW, AND WHY ACCIDENT OCCURRED AND CORRECTIVE ACTION

3. DATE OF ACCIDENT: Oct. 8, 1947
4. TIME: 2 P.M.
5. EXACT LOCATION OF ACCIDENT: Station 9-00 of stream gauging sec., Highway bridge over Big Sandy River at Louisa, Ky.

6. DESCRIPTION BY INJURED PERSON, IF PROPERTY DAMAGE ONLY, BY PERSONS MOST CLOSELY ASSOCIATED WITH ACCIDENT (*Tell the complete story of what happened, no signature required*)
While making discharge measurement, I was lowering sounding weight to bottom of river by use of reel and crank. Submerged log hit cable, knocking crank out of hand. Crank handle struck nose and forehead.

7. DESCRIPTION BY RESPONSIBLE SUPERVISOR—CIVILIAN OR MILITARY (*What led up to the accident, how did accident actually happen? … was wrong with equipment, material or layout and what was done wrong. Be specific*)
[illegible] measurements were being made during highwater. Due to fact that the brake on the reel was defective, the sounding weight was being lowered by use of crank. Normally the sounding weight is lowered by using brake only. Crank should be replaced with hand-wheel.

8. WHAT ACTUALLY HAS BEEN DONE TO CORRECT CONDITIONS CAUSING THE ACCIDENT?
Defective brake has been repaired and hand-wheel ordered.

9. WHAT REMAINS TO BE DONE TO CORRECT SUCH CONDITIONS AND WHY?
Get approval for purchase of hand-wheel to replace crank. Such purchase requires approval by head of plant section.

Section III CONSEQUENCES AND RELATED DATA

10a. INJURY TO (Check one)
REPORTING AGENCY: (1) Military personnel; (2) Civilian employees X; (3) Contractor personnel
OTHER: (4) Other Federal agency personnel; (5) Nonfederal person

10b. PROBABLE DISABILITY (Check one)
(1) Death; (2) Temporary total X; (3) Permanent total; (4) Temporary partial; (5) Permanent partial; (6) First aid

10c. ESTIMATED DAMAGE TO PROPERTY OR EQUIPMENT (Fill in one or more)
(1) Reporting agency: $ 100.00
(2) Contractor*: $
(3) Other Federal agency: $
(4) Nonfederal: $
* Contractor of reporting agency

11. DESCRIPTION OF PROPERTY OR EQUIPMENT DAMAGED
Loss of sounding weight and discharge measurement device.

12. OWNERSHIP OF PROPERTY OR EQUIPMENT DAMAGED (Name and home address)
Corps of Engineers, Huntington District, Huntington, W. Va.

13. NAME AND HOME ADDRESS OF INJURED
John D. Doe, 2000 Main St., Huntington, W.Va.
14. SEX: M
15. AGE: 43
16. BADGE OR SERVICE NO.: None

17. REGULAR OCCUPATION OF INJURED: Engineer Aide
18. OFFICIAL ASSIGNMENT AT TIME OF ACCIDENT: Stream gauging

19. NATURE OF INJURY AND PART OF BODY INVOLVED
Laceration and contusions on nose and [illegible]
20. DATE INJURED STOPPED WORK: Oct. 9, 1947
21. DATE INJURED RETURNED TO WORK: Oct. 11, 1947

Sec. IV WITNESSES

22. NAMES AND ADDRESSES OF WITNESSES
Ralph B. Black — 9097 South St., Huntington, W. Va.
James E. Brown — 8089 Tenth St., Huntington, W. Va.

Sec. V SUPERVISOR

23. DATE: Oct. 11, 47
TITLE (Civilian or military): Chief, Stream Gauging Section
SIGNATURE: Howard T. [illegible]

Section VI REVIEW AND COMMENT

24. COMMENTS ON ADEQUACY OF CORRECTIVE ACTION TAKEN OR PLANNED INCLUDING PROGRESS ON PENDING ACTIONS
Instructions have been issued that brake is to be used in lowering sounding weights with crank disengaged in all cases. Purchase of hand-wheels to replace all cranks has been approved.

25. DATE: 10-12-47
TITLE (Civilian or military): Chief, Engineering Div.
SIGNATURE OF REVIEWING OFFICIAL: John R. Randall

SECTION III (Continued)

(5) TEMPORARY PARTIAL. — An injury which prevents the injured person from performing his own job on any day or shift subsequent to the day of injury, but does not prevent his performing another regularly established job.

(6) FIRST AID (*Medical Treatment Case*).—An injury which requires medical treatment only and does not result in loss of time.

Item 10c. Property or equipment includes material. Give closest estimate possible of damage; do not state "unknown," "undetermined." Each loss must be explained in item 11.

(1) REPORTING AGENCY.—Department or establishment indicated in item 1b.

Item 11. Include damage to material.

Item 18. Work or duty assignment by supervisor at time of accident.

Item 20. The date of the first day (*subsequent to the date shown in item 3*) when the injured commenced losing time.

Item 21. The day injured returned to work; report shall not be delayed beyond the end of calendar month for completion of this item.

SECTION IV

Item 22. Should be "eye witnesses" if available; if not, first persons hearing of accident from injured person or other sources.

SECTION V

Item 23. Supervisor responsible for the information in items 3–22, inclusive.

SECTION VI

Item 24. The designation of the reviewing official is the responsibility of the department or establishment but should be an operating official above the level of the supervisor indicated in item 23.

REMARKS:

USE ADDITIONAL PLAIN SHEETS OF PAPER IF NECESSARY

EXHIBIT 1(16)10-8

PLACE OF EMPLOYMENT—State in detail the place of employment. Example: If Government employee—Supervising Internal Revenue Agent, Audit Division, Internal Revenue Service, Chicago, Illinois. If non-Government employee—Accountant, Argo Laundry, 22 West LaSalle Street, Chicago, Illinois.

PLACE OF ACCIDENT AND DATE—Give exact description of place of accident and the hour and date.

INVESTIGATIVE OFFICER'S SKETCH—If an automobile accident, attach a sketch which shows in black the relative positions of the colliding vehicles or of the vehicle and pedestrian just before the collision. Show in red their relative positions just after the collision. Label the compass directions, streets, and every object detected and indicate measurements showing by dotted lines the course followed by each vehicle and add any explanatory statement that would aid in the understanding of the occurrence.

DUTY STATUS—If a Government employee is involved, determination should be made if he was engaged in the performance of official duty at time of accident. If not, or in doubt, give detailed statement of facts.

NATURE OF INJURY—State extent of personal injury. In such cases, it is important that medical testimony be secured as soon after the accident as possible as to the extent of the injuries.

MEDICAL ATTENTION—Give name and address of physician(s) who attended injured private individuals, time of attendance and name and address of hospital, if any.

REPORT OF DEATH—If accident resulted in death of private party give exact time, date, place, and immediate cause and in addition, names, relationship, and addresses of all persons known to be dependent in any degree upon the decedent at time of death. Include copy of death certificate.

PROPERTY DAMAGE—Photographs should be obtained, if deemed necessary and such is possible, showing the extent of the damage to Government or privately-owned vehicle(s) or property in addition to the estimated cost of repairs furnished by a reputable contractor after personal examination. If a non-Federal person is liable for damages to Government property, make a statement as to any action taken by responsible officials to effect a satisfactory settlement.

GOVERNMENT VEHICLE AND DRIVER—If Government vehicle is involved, give make, year, model, service number, name and age of driver, title, and station. State if there is any indication Government vehicle was not in proper operating condition or was not properly serviced.

PRIVATE VEHICLE, OWNER, AND DRIVER—If private vehicle is involved, give make, year, model, license number, name and address of owner, name, age and address of driver, and driver's license number.

PHYSICAL ELEMENTS PRESENT—State physical elements present such as condition of weather and light at time of accident or condition of flooring or stairways, roadways, etc., as appropriate. These data should be obtained from witnesses and local Weather Bureau. Whether traffic signals or streetcar loading platform at scene; if so, relationship to accident.

POLICE REPORT—If city, State, or other enforcement officials or guards reported on the accident, attach copy of report, including copies of police photographs related to the accident.

TRAFFIC REGULATIONS VIOLATED—Quote or attach copy of traffic regulations violated, if any.

WITNESSES—List witnesses and exhibit numbers of statements. All statements by witnesses should be set forth on SF's 94 (see Exhibit 1(16)10-9), if available; otherwise, in any practicable format.

EXHIBITS—Each statement or report of interview of a witness, as well as photographs and other documentary evidence, should be given an exhibit number and arranged in appropriate form. Signed statements should be obtained from all witnesses.

NARRATIVE STATEMENTS—Include any other pertinent facts not included in the report elsewhere. An investigative report shall not include opinions of the investigator as to the merits of or legal liability in the case, but if there is conflicting testimony, the investigator's opinion as to the credibility of the various witnesses should be given. Set forth any information which would be helpful in making a determination as to whether the accident was caused by willful misconduct by the person sustaining the injury or property damage; whether the parties involved were under the influence of liquor; whether there was negligence or contributory negligence by either party; and whether any unsafe actions or practices of violations of safety regulations may have contributed to the accident.

EXHIBIT 1(16)10–9

Standard Form 94
Re[illegible]ed June [illegible]
Promulgated
by Bureau of the Budget
Circular A-5 (Rev.)

STATEMENT OF WITNESS

(Use additional sheets if necessary)

1. DID YOU SEE THE ACCIDENT? Yes	2. WHEN DID IT HAPPEN? *(Time and date)* About 8:45 a.m. 4/4/66	3. WHERE DID IT HAPPEN? *(Street location and city)* Lemon Avenue and Westside Drive, Dallas, Texas

4. TELL IN YOUR OWN WAY HOW THE ACCIDENT HAPPENED

I was standing at the bus stop near Lemon Avenue and Westside Drive when I noticed a car coming up Lemon at what appeared to be a reasonable rate of speed. Just before the car got to Westside Drive a Plymouth which had been stopped at a stop sign pulled out and started to turn left. The car coming up Lemon could not stop in time and hit the Plymouth.

5. WHERE WERE YOU WHEN THE ACCIDENT OCCURRED?

Waiting at the bus stop on Lemon Avenue, opposite where Westside Drive comes into Lemon.

6. WAS ANYONE INJURED, AND IF SO, EXTENT OF INJURY IF KNOWN?

The driver of the plymouth was rubbing his left shoulder, but he said it was nothing serious.

7. DESCRIBE THE APPARENT DAMAGE TO PRIVATE PROPERTY

The rear end of one car was pretty well dented.

8. DESCRIBE THE APPARENT DAMAGE TO GOVERNMENT PROPERTY

The front end of the Ford was smashed in, particularly on the right side and the radiator was leaking.

9. IN TRAFFIC CASES STATE APPROXIMATE SPEED *(Miles per hour)*	(a) GOVERNMENT VEHICLE	(b) OTHER VEHICLE
	20 MPH	10 MPH

10. GIVE THE NAMES AND ADDRESSES OF ANY OTHER WITNESSES TO THE ACCIDENT

NAMES	ADDRESSES
I didn't notice any one else in the vicinity.	

11. DATE	SIGNATURE
April 4, 1966	Mildred Collins

12. HOME ADDRESS	TELEPHONE NO.
4115 Westside Drive, Dallas, Texas	Di. 2-3492

13. BUSINESS ADDRESS	TELEPHONE NO.
1204 Mercantile Bank Building, Dallas, Texas	Ho. 1-6091

14. INDICATE ON THE DIAGRAM BELOW WHAT HAPPENED:

1. Number Federal vehicle as 1–other vehicle as 2–additional vehicle as 3, and show direction of travel by arrow (*Example:* ⟶ [1⟩ ⟨2] ⟵)
2. Use solid line to show path before accident ——— [2⟩
   Broken line after accident - - - - - - [2⟩
3. Show pedestrian by ⟶ ○
4. Show railroad by ┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼
5. Give names or numbers of streets or highways
6. Indicate north by arrow in this circle (→)

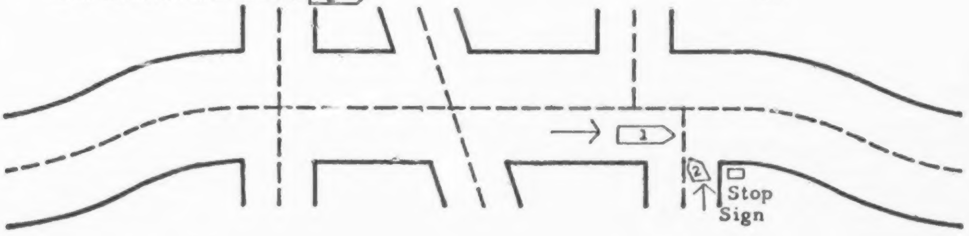


EXHIBIT 1(16)10-9—*Cont.*

FILE REFERENCE:

Mrs. Mildred Collins
4115 Westside Drive
Dallas, Texas

This office has been advised that you witnessed an accident which occurred at the intersection of Lemon Avenue and Westside Drive, Dallas, Texas, on April 4, 1966, at about 8:45 a.m. involving a Government-owned 1965 Ford sedan and a 1965 Plymouth sedan.

It will be helpful if you will answer, as fully as possible, the questions on the back of this letter.

Your courtesy in complying with this request will be appreciated. An addressed envelope, which requires no postage, is enclosed for your convenience in replying.

Sincerely yours,

H. L. Baker

Encl.

U. S. GOVERNMENT PRINTING OFFICE 16—86703-1

(OVER)

EXHIBIT 1(16)10-10

Standard Form 95
Revised February 1963
Bureau of the Budget
Circular A-5 (Rev.)

CLAIM FOR DAMAGE OR INJURY

(Use additional sheets if necessary)

95-104

SUBMIT TO: Commissioner
Internal Revenue Service
Washington, D. C. 20224

Use ink or typewriter. See reverse side for instructions and additional information required.

1. NAME OF CLAIMANT (*Please print full name*) Earl Torgeson	2. AGE	3. MARITAL STATUS	8. AMOUNT OF CLAIM
4. ADDRESS OF CLAIMANT (*Street, city, zone, State*) 923 Elm Street, Dallas, Texas			PROPERTY DAMAGE $ 245.00
5. NAME AND ADDRESS OF SPOUSE, IF ANY			PERSONAL INJURY $ 125.00
6. PLACE OF ACCIDENT (*Give city or town and State; if outside city limits, indicate mileage or distance to nearest city or town*) Dallas, Texas			TOTAL $ 370.00
7. DATE AND DAY OF ACCIDENT April 4, 1966	TIME (*A.M. or P.M.*) 8:45 a.m.		

9. DESCRIPTION OF ACCIDENT—STATE BELOW, IN DETAIL, ALL KNOWN FACTS AND CIRCUMSTANCES ATTENDING THE DAMAGE OR INJURY, INDENTIFYING PERSONS AND PROPERTY INVOLVED AND THE CAUSE THEREOF

I was driving west on Westside Drive and stopped for a stop sign at the intersection of Westside and Lemon Streets. I then proceeded through the intersection. When my car was about halfway through it was struck on the left rear by a Government car operated by Thomas Landvoight, A&TT Investigator, Internal Revenue Service. The rear of my car was damaged to the extent of $245 and I had doctors' bills, including X-Ray, of $125 due to an injury to my neck.

10. PROPERTY DAMAGE

NAME OF OWNER, IF OTHER THAN CLAIMANT	ADDRESS OF OWNER, IF OTHER THAN CLAIMANT

BRIEFLY DESCRIBE KIND AND LOCATION OF PROPERTY AND NATURE AND EXTENT OF DAMAGE. SEE INSTRUCTIONS ON REVERSE SIDE FOR METHOD OF SUBSTANTIATING CLAIM

Left rear door, left rear wheel, and left rear fender, and trunk lid. Itemized receipted bill for the repair work attached.

11. PERSONAL INJURY

STATE NATURE AND EXTENT OF INJURY WHICH FORMS THE BASIS OF THIS CLAIM

Due to impact of cars head was snapped to the side with resulting injury to neck. Statement by Dr. J. H. Burns concerning injury attached, as well as receipted bills for services by Dr. Burns and Memphis X-Ray laboratories.

12. WITNESSES

NAMES	ADDRESSES
Mildred Collins	4115 Westside Drive, Dallas, Texas

CRIMINAL PENALTY FOR PRESENTING FRAUDULENT CLAIM OR MAKING FALSE STATEMENTS

Fine of not more than $10,000 or imprisonment for not more than 5 years or both. (*See 62 Stat. 698, 749; 18 U.S.C. 287, 1001.*)

CIVIL PENALTY FOR PRESENTING FRAUDULENT CLAIM

The claimant shall forfeit and pay to the United States the sum of $2,000, plus double the amount of damages sustained by the United States. (*See R.S. §3490, 5438; 31 U.S.C 231.*)

13 *I DECLARE UNDER THE PENALTIES OF PERJURY* THAT THE AMOUNT OF THIS CLAIM COVERS ONLY DAMAGES AND INJURIES CAUSED BY THE ACCIDENT ABOVE DESCRIBED. I AGREE TO ACCEPT SAID AMOUNT IN FULL SATISFACTION AND FINAL SETTLEMENT OF THIS CLAIM.

SIGNATURE OF CLAIMANT
Earl Torgeson

DATE OF CLAIM
April 15, 1966

NOTE: Signature used above should be used in all future correspondence.

EXHIBIT 1(16)10-10—*Cont.*

NOTICE TO CLAIMANT

In order that your claim for damages may receive proper consideration you are requested to supply the information called for on both sides of this form. All material facts should be stated on this form, as it will be the basis of further action upon your claim. The instructions set forth below should be read carefully before the form is prepared.

INSTRUCTIONS

Claims for damage to or for loss or destruction of property, or for personal injury, must be signed by the owner of the property damaged or lost or the injured person. If, by reason of death, other disability or for reasons deemed satisfactory by the Government, the foregoing requirement cannot be fulfilled, the claim may be filed by a duly authorized agent or other legal representative, provided evidence satisfactory to the Government is submitted with said claim establishing authority to act.

If claimant intends to file claim for both personal injury and property damage, claim for both must be shown in item 8 on this form. Separate claims for personal injury and property damage are not acceptable.

The amount claimed should be substantiated by competent evidence as follows:

(*a*) In support of claim for personal injury or death, the claimant should submit a written report by the attending physician, showing the nature and extent of injury, the nature and extent of treatment, the degree of permanent disability, if any, the prognosis, and the period of hospitalization, or incapacitation, attaching itemized bills for medical, hospital, or burial expenses actually incurred.

(*b*) In support of claims for damage to property which has been or can be economically repaired, the claimant should submit at least two itemized signed statements or estimates by reliable, disinterested concerns, or, if payment has been made, the itemized signed receipts evidencing payment.

(*c*) In support of claims for damage to property which is not economically reparable, or if the property is lost or destroyed, the claimant should submit statements as to the original cost of the property, the date of purchase, and the value of the property, both before and after the accident. Such statements should be by disinterested competent persons, preferably reputable dealers or officials familiar with the type of property damaged, or by two or more competitive bidders, and should be certified as being just and correct.

Any further instructions or information necessary in the preparation of your claim will be furnished, upon request, by the office indicated at the top of the other side of this form.

INSTRUCTIONS REGARDING INSURANCE COVERAGE

In order that subrogation claims may be adjudicated, it is essential that the claimant provide the following information regarding the insurance coverage of his vehicle:

DO YOU CARRY COLLISION INSURANCE? ☒ YES ☐ NO	IF YES, GIVE NAME AND ADDRESS OF INSURANCE COMPANY AND POLICY NUMBER National Insurance Corporation Dallas, Texas Policy No. 12345678
HAVE YOU FILED CLAIM ON YOUR INSURANCE CARRIER IN THIS INSTANCE, AND IF SO, IS IT FULL COVERAGE OR DEDUCTIBLE? Yes Deductible	IF DEDUCTIBLE, STATE AMOUNT $50.00

IF SUCH CLAIM HAS BEEN FILED, WHAT ACTION HAS YOUR INSURER TAKEN, OR WHAT ACTION DOES IT PROPOSE TO TAKE WITH REFERENCE TO YOUR CLAIM? (*It is necessary that you ascertain these facts*)

As liability appears to lie with U. S. Government, the insurance company is taking no action pending outcome of this claim. If claim not approved, insurance company will pay property damage over $50 and file claim or suit against the Government as subrogee.

DO YOU CARRY PUBLIC LIABILITY AND PROPERTY DAMAGE COVERAGE? ☒ YES ☐ NO	IF YES, GIVE NAME OF INSURANCE CARRIER Same as above

SIGNATURE OF CLAIMANT Carl Torgeson

U.S. GOVERNMENT PRINTING OFFICE : 19[illegible]—O-653283 843-C

Treasury Department
Form No. 3079 (8-65)

TD 045 0C

CIVILIAN EMPLOYEE CLAIM FOR LOSS OR DAMAGE TO PERSONAL PROPERTY (P.L. 88-558)

Use ink or typewriter and submit in duplicate. See reverse side for instructions and additional information required.

1. Name, Grade, and Title of Claimant *(Please print full name)* James J. Harris GS-9, Administrative Assistant	
2. Address of Claimant *(Street, City, State, Zip Code)* 202 Washington Street New York, New York 61111	5. Amount of Claim $30.00
3. Current Post of Duty Room 1224 614 Indiana Avenue New York, New York	6. Place where loss or damage occurred Federal Building New York, New York
4. Post of Duty at Time of Loss or Damage Same as 3. above	7. Date of Loss or damage April 1, 1966

8. Description of Property

Itemized Listing	Date Acquired	Purchase Price or Value	Value when Lost or Damaged	Estimated Repair Cost
Raincoat, wash and wear with removable lining	March 10, 1966	$30.00	$30.00	$12.00

(Attached supplemental sheet, if necessary)

9. Brief statement of circumstances:

Upon entering the Federal Building to report for work on April 1, 1966, I caught the right pocket of my raincoat on a protruding bolt on the entrance door and tore the pocket causing a rip about 12" long. The bolt was left when a handle had been removed and not replaced. I can have the tear stitched by a tailor, but the repair would be most unsightly.

CRIMINAL PENALTY FOR PRESENTING A FRAUDULENT CLAIM OR MAKING FALSE STATEMENTS:

Fine or not more than $10,000 or imprisonment for not more than 5 years or both *(See 62 Stat. 698, 749; 18 U.S.C. 287, 1001)*

CIVIL PENALTY FOR PRESENTING A FRAUDULENT CLAIM: The claimant shall forfeit and pay to the United States the sum of $2,000, plus double the amount of damages sustained by the United States. *(See R.S. Sec. 3490, 5438; 31 U.S.C. 231)*

10. I make this claim with full knowledge of the penalties for wilfully making a false claim, and certify that I am entitled to any payment.

11. I hereby assign to the United States, to the extent of any payment on this claim accepted by me, all my right, title, and interest in and to any claim I may have against any carrier, insurer or other party, arising out of the above-described incident.

Date of Claim	If claimant is not owner, state relationship	Signature of Claimant
April 6, 1966		James J. Harris

EXHIBIT 1(16)10-11—*Cont.*

INSTRUCTIONS

(a) In support of claims for damage to property which has been or can be economically repaired, the claimant should submit at least two itemized signed statements or estimates by reliable, disinterested concerns, (only one statement or estimate need be submitted if the amount claimed is $100 or less) or, if payment has been made, the itemized signed receipts evidencing payment.

(b) In support of claims for damage to property which is not economically reparable, or if the property is lost or destroyed, the claimant should submit statements as to the original cost of the property, the date of purchase, and the value of the property, both before and after the accident. Such statements should be by disinterested competent persons, preferably reputable dealers or officials familiar with the type of property damaged, or by two or more competitive bidders, and should be certified as being just and correct.

(c) See section 6 of Treasury Military Personnel and Civilian Employees' Claims Act Regulations for the additional evidence required for claims for property loss in quarters or other authorized places; claims for property loss by theft; claims for transportation losses; claims for property losses due to marine or aircraft disaster; claims for property losses due to enemy action, public disaster, etc.; claims for property losses when the property was used for benefit of the government; claims for loss of money deposited for safekeeping, transmittal, or other authorized dispositions; and claims for motor vehicles damaged while being shipped.

(d) See section 7 of Treasury Military Personnel and Civilian Employees' Claims Act Regulations for additional procedures that must be followed in claims involving a carrier or insurer.

(e) The maximum amount allowable on any claim is $6,500.

☆ U. S. GOVERNMENT PRINTING OFFICE : 1972 O - 455-452